BIOLOGICAL ASSESSMENT

FOR

AQUATIC WILDLIFE

FRENCH MEADOWS PROJECT

AMERICAN RIVER RANGER DISTRICT
TAHOE NATIONAL FOREST

MARCH 2018

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I. EXECUTIVE SUMMARY

DATE: March, 2018

PROJECT NAME: French Meadows Project

SCOPE OF AREA AFFECTED: The French Meadows Project (proposed action or project) surrounds French Meadows Reservoir, on the Tahoe National Forest, approximately 20 miles northeast of Foresthill, California. The project is located in the Dolly Creek-Middle Fork American River watershed, bounded by Red Star Ridge to the northwest, Mildred Ridge to the east, and the Tahoe National Forest (TNF) boundary to the south. Elevations in the project area range from 5,200 to 7,300 feet. Figure 1 shows the general location of the French Meadows project area. The legal location includes portions of T15N, R13E Sections 25, 26, 35, and 36; and T15N, R14E, Sections 2, 3, 10, 11, 14-17, 19-22, 24, 26-34, 36 of the Mount Diablo Base Meridian, in Placer County, California.

The project area encompasses 27,623 acres and includes 19 individual treatment units totaling approximately 12,183 acres.

BRIEF DESCRIPTION OF PROJECT: The proposed action is to use ecologically-based thinning, prescribed fire, removal of encroaching conifers, and similar approaches to improve forest and watershed health and resilience, to enhance wildlife habitat, and to reduce the risk of uncharacteristic, high-severity wildland fire, consistent with management direction in the Tahoe National Forest Land and Resource Management Plan (USDA Forest Service 1990) as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (USDA Forest Service 2004). Treatments include a combination of prescribed fire, hand and mechanical thinning, mastication, machine piling, and hazard tree removal. In limited areas, tree planting and removal of vegetation that is competing with planted trees using mechanical or hand grubbing techniques (release) are proposed. In addition, the proposed action includes restoration of meadows, aspen and cottonwood stands; protection of rust-resistant sugar pines; building non-motorized trails, making road improvements for access and to enhance hydrologic function; and implementing a research project by the University of California Merced to quantitatively evaluate forest management impacts on hydrology and forest health.

Table 1. Executive Summary of Species Considered for Analysis in this Biological Assessment.

SPECIES	SPECIES STATUS[1]	OCCURS OR HAS SUITABLE HABITAT WITHIN THE PROJECT AREA	EFFECTS DETERMINATION[1]	REASON FOR NO EFFECT, IF APPLICABLE
Delta smelt (*Hypomesus transpacificus*)	T	No	No effect	Project is outside range of species
Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)	T	No	No effect	Project is outside range of species
California red-legged frog (*Rana draytonii*)	T	No	No effect	Project is outside range of species
Sierra Nevada yellow-legged frog (*Rana sierrae*)	E	Yes – Habitat Only	May affect, NLAA	N/A

[1]Key: E = USFWS Endangered, T = USFWS Threatened, NLAA = may affect, not likely to adversely affect

.

PROJECT ANALYSIS: The species-specific findings of this Biological Assessment for federally threatened, endangered, proposed, or candidate aquatic wildlife species for the French Meadows Project are summarized above in Table 1.

STATUS OF CONSULTATION WITH THE USFWS: The US Fish and Wildlife Service (USFWS) is contacted every 90 days to obtain a current list of endangered, threatened, proposed, and candidate species that may be affected by activities on the TNF. This list is maintained at 50 CFR 17.11. The most recent list (online at http://ecos.fws.gov/ipac/) was verified December 6, 2017 (Appendix A). Initial contact with the USFWS Forest and Foothills Branch Office in Sacramento, CA for this project (regarding *Rana sierrae*) occurred on February 14, 2018. Consultation regarding this species will be completed upon receipt of a USFWS letter of concurrence. This species is not known to occur, but has suitable habitat in the analysis area and may be affected by the action alternative (refer to Section VI "Existing Environment, Effects of the proposed action and Alternatives, and Determinations" for the rationale that led to each determination). Consultation regarding effects to Sierra Nevada yellow-legged frogs will be included in an appended batch of projects submitted to USFWS. This process is described in more detail in Section III.

DETERMINATIONS:

Alternative 1 (Proposed Action)

It is my determination that the French Meadows Project **will not affect** the Delta smelt, Lahontan cutthroat trout, and California red-legged frog.

It is my determination that the French Meadows Project **may affect, but is not likely to adversely affect** the Sierra Nevada yellow-legged frog.

II. INTRODUCTION

The purpose of this Biological Assessment (BA) is to document analysis of the potential effects of the proposed French Meadows Project (proposed action or project) on United States Department of the Interior Fish and Wildlife Service (USFWS) threatened, endangered, proposed, and candidate aquatic wildlife species, as recorded in 50 CFR 17.11 (verified December 6, 2017). This BA was prepared in accordance with Forest Service Manual (FSM) direction 2672.24 and meets legal requirements set forth under Section 7 of the Endangered Species Act of 1973, as amended, and implementing regulations [19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14 (c)].

III. CONSULTATION TO DATE

USFWS is contacted every 90 days to obtain a current list of threatened, endangered, proposed and candidate species that may be present in the Forest Service Tahoe National Forest (TNF. The most recent project-specific list was reported December 6, 2017 and is provided as Appendix A. Initial contact with the USFWS Forest and Foothills Branch Office in Sacramento, CA for this project occurred (regarding Sierra Nevada yellow-legged frog [SNYLF] *Rana sierrae*) on February 14, 2018. Consultation regarding this species, which is not known to occur in the analysis area but has suitable habitat that may be affected by the proposed action (refer to Section VI "Existing Environment, Effects of the proposed action and Alternatives, and Determinations" for the rationale that led to each determination), will be completed upon receipt of a USFWS letter of concurrence.

Forest plans for National Forests lying within the Sierra Nevada were amended under the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001 and 2004). The Regional Forester consulted with the California and Nevada Operations Office of USFWS on the amendments. The Biological Opinion (BO) for the amendment was dated January 11, 2001. The determination in the BO is that the selected action is not likely to jeopardize the continued existence of species listed pursuant to the Endangered Species Act (bald eagle (which was subsequently delisted), California red-legged frog, valley elderberry longhorn beetle, and Lahontan cutthroat trout). No terms or conditions were provided. Conservation recommendations are discussed in the corresponding species portions of this BA where applicable to TNF species and management activities.

The Forest Service conducted programmatic consultation with the USFWS on nine programs on nine National Forests in the Sierra Nevada for the endangered Sierra Nevada yellow-legged frog (*Rana sierrae*), the Northern Distinct Population of the mountain yellow-legged frog (*Rana muscosa*), and the threatened Yosemite toad (*Anaxyrus canorus*) in June 2014. The programmatic consultation included vegetation management on the nine National Forests, including the Tahoe NF and was included in the resulting programmatic BO from the USFWS. The resulting determination was that these projects may affect the three listed amphibian species and was likely to adversely affect them. In addition, the French Meadows Project will be appended to the programmatic BO to be included in the next round of projects (Batch 18a) to meet the consultation requirement for this species. The TNF is outside the range of the Yosemite toad and the Northern Distinct Population Segment (DPS) of the mountain yellow-legged frog, but does contain known populations of SNYLF. The programmatic BO included requirements and recommendations for ongoing management, monitoring and reporting to limit adverse effects.

IV. CURRENT MANAGEMENT DIRECTION

Current management direction on desired future conditions for federally threatened, endangered, proposed and candidate species in the TNF can be found in the following documents, filed at the District Office:

- Forest Service Manual and Handbooks (FSM/FSH 2670);
- National Forest Management Act (NFMA);
- Endangered Species Act (ESA);
- National Environmental Policy Act (NEPA);
- Tahoe National Forest Land and Resource Management Plan (1990), as amended by the 1999 Record of Decision for the Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement (HFQLG) [as revised by the 2003 Record of Decision for the Herger-Feinstein Quincy Library Group Forest Recovery Act Final Supplemental Environmental Impact Statement], and the 2004 Record of Decision for the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement;
- Species specific Recovery Plans which establish population goals for recovery of those species;
- Species management plans;
- Species management guides or conservation strategies; and
- Regional Forester policy and management direction.

The TNF Land and Resource Management Plan (LRMP; USDA Forest Service 1990) was amended in 2001 by the Record of Decision for the Sierra Nevada Forest Plan Amendment (SNFPA) (USDA Forest Service 2001), which was then replaced in its entirety by the 2004 Record of Decision (ROD) for the SNFPA Final Supplemental Environmental Impact Statement (USDA Forest Service 2004). Detailed information including specific standards and guidelines for species management can be found in the SNFPA 2004. General Forest Service direction for Threatened, Endangered, and Sensitive species is summarized below:

FSM 2670.31 THREATENED AND ENDANGERED SPECIES

1) Place top priority on conservation and recovery of endangered, threatened, and proposed species and their habitats through relevant National Forest System, State and Private Forestry, and Research activities and programs.

2) Establish through the Forest planning process objectives for habitat management and/or recovery of populations, in cooperation with States, the USFWS, and other Federal agencies.

3) Through the biological evaluation process, review actions and programs authorized, funded, or carried out by the Forest Service to determine their potential for effect on threatened and endangered species and species proposed for listing.

4) Avoid all adverse impacts on threatened and endangered species and their habitat except when it is possible to compensate adverse effect totally through alternatives identified in a biological opinion rendered by the USFWS, or when the USFWS BO recognizes an incidental taking. Avoid adverse impacts on species proposed for listing during the conference period and while their Federal status is being determined.

5) Initiate consultation or conference with the USFWS when the Forest Service determines that proposed activities may have an adverse effect on threatened, endangered, or proposed species or when Forest Service projects are for the specific benefit of a threatened or endangered species.

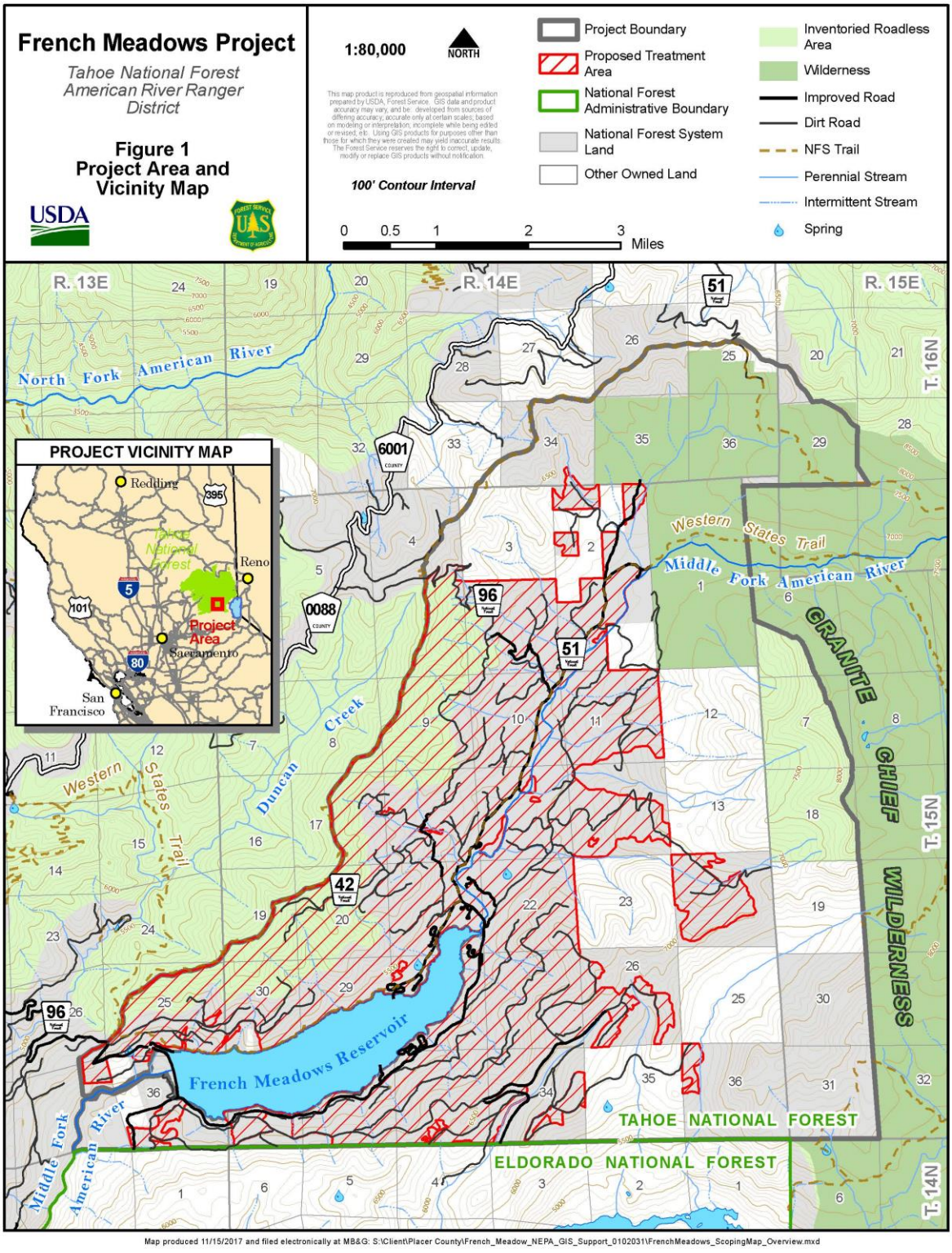
6) Identify and prescribe measures to prevent adverse modification or destruction of Critical Habitat and other habitats essential for the conservation of endangered, threatened, and proposed species. Protect individual organisms or populations from harm or harassment as appropriate.

V. DESCRIPTION OF THE PROPOSED PROJECT AND ALTERNATIVES

The TNF is working with partners including the American River Conservancy (ARC), the Sierra Nevada Conservancy (SNC), the Placer County Water Agency (PCWA), The Nature Conservancy (TNC), the Sierra Nevada Research Institute (SNRI), and Placer County to restore National Forest System lands in proximity to French Meadows Reservoir. The Forest Service is proposing this project to improve forest and watershed health and resilience, to enhance wildlife habitat, and to reduce the risk of uncharacteristic, high-severity wildland fire, consistent with management direction in the TNF LRMP (USDA Forest Service 1990) as amended by the SNFPA ROD (USDA Forest Service 2004), collectively referred to as the Forest Plan.

The proposed action within the 27,623-acre French Meadows Project area is to use ecologically-based thinning, prescribed fire, removal of encroaching conifers, and similar approaches to achieve project objectives. A map of the project area is provided in Figure 1. Treatments include a combination of prescribed fire, hand and mechanical thinning, mastication, machine piling, and hazard tree removal. In limited areas, tree planting and removal of vegetation competing with planted trees using mechanical or hand grubbing techniques (release) are proposed. In addition, the proposed action includes restoration of meadows, aspen and cottonwood stands, protection of rust-resistant sugar pine, building non-motorized trails, making road improvements for access and to enhance hydrologic function, and implementing a research project by the University of California (UC) Merced to quantitatively evaluate forest management impacts on hydrology and forest health.

Figure 1. French Meadows Project Area and Vicinity Map.



A complete description of the proposed action (Alternative 1), the No Action Alternative (Alternative 2) and Alternative 3, which follows the recommendations of the May 25, 2015 Draft Interim Recommendations for Management of California Spotted Owl Habitat on National Forest Lands, is provided in Appendix B. Table 2, below, provides a summary of treatment acreages under Alternatives 1 and 3.

Table 2. Summary of Forest Treatments Proposed under Alternative 1 (Proposed Action) and Alternative 3.

Treatment Type (*Initial/Follow-up*)	Acres	
	Alternative 1 (Proposed Action)	**Alternative 3**
Mechanical Thin	**2,082**	**632**
Mechanical Thin/ Mechanical Fuels Treatment	*1,496*	*529*
Mechanical Thin/ Prescribed Fire	*586*	*103*
Mechanical Thin (Plantations and Small Trees)	**1,887**	**699**
Mechanical Thin Natural Stands (Small Trees)/ Mechanical Fuels Treatment	*1652*	*563*
Mechanical Thin Natural Stands (Small Trees)/ Prescribed Fire	*83*	*22*
Mechanical Thin Plantation	*152*	*114*
Mastication (Plantations and Natural Stands)	**1,432**	**1,366**
Mastication Thin Natural Stands	*283*	*275*
Mastication Thin Natural Stands/ Prescribed Fire	*83*	*83*
Mastication Thin Plantation	*655*	*597*
Release Mastication (Plantation)	*102*	*102*
Release Mastication (Plantation)/ Prescribed Fire	*308*	*309*
Thinning (Mechanical or Hand) in Recreation Sites	**136**	**136**
Hand Thin	**340**	**1313**
Reforestation - Site Prep and Plant	**102**	**102**
Prescribed Fire	**6,205**	**7,872**
Total	**12,183**	**12,119**

MANAGEMENT REQUIREMENTS

The proposed action includes resource management requirements that were designed for consistency with applicable Standards and Guidelines (S&Gs) and best management practices (BMPs) included in the Forest Plan. A full list of management requirements incorporated into the proposed action is provided in Appendix B. Listed below are those management requirements which would avoid or minimize potential impacts on SNYLF and their habitat. These requirements were developed specifically for consistency with the Terms & Conditions of the Programmatic BO (USFWS 2014b), as well as applicable S&Gs associated with Forest Service Riparian Conservation Objectives (RCOs) (refer to Appendix C).

Aquatic Wildlife

AW1: If a sensitive or listed amphibian or reptile is sighted within the project area, inform a Forest Service aquatic biologist of the sighting immediately. If determined necessary, avoidance and protection measures will be developed and implemented based on the species, nature of work required, and site-specific conditions, and consistent with Terms & Conditions, 2(c), of the Programmatic BO.

AW2. Tightly woven fiber netting or similar material shall be not used for erosion control or other purposes within suitable habitat to ensure that special-status amphibians do not get trapped, injured or killed. Plastic mono-filament netting or similar material shall not be used for this project because individuals may become entangled or trapped in it (Programmatic BO, Terms & Conditions, 2(b)).

AW3. To the extent feasible, French Meadows Reservoir will be used for water drafting purposes. The following actions will be taken prior to use of other water drafting locations:

- Consult with the Forest Service aquatic biologist to obtain approval for use of the additional water drafting locations and to determine whether the location represents suitable habitat for SNYLF or other sensitive aquatic species (S&G 92).

- If required, conduct surveys for SNYLF or other sensitive aquatic species and submit survey results to the Forest Service aquatic biologist. If necessary, avoidance and protection measures will be developed in consultation with resource agencies based on the species and site-specific conditions and implemented.

AW4: Use water drafting devices with 2-mm or less screening and place hose intake into bucket in the deepest part of the pool. Use a low velocity water pump and do not pump ponds to low levels beyond which they cannot recover quickly (approximately 1 hour) (S&G 110).

AW5: For fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute (gpm) for streamflow greater than or equal to 4 cubic feet per second (cfs) nor exceed 20 percent of surface flows for streamflow less than 4 cfs. For non-fish-bearing streams, the drafting rate should not exceed 350 gpm for streamflow greater than or equal to 2 cfs, nor exceed 50 percent of surface flows. Water drafting should cease when bypass surface flows drop below 1.5 cfs on fish-bearing streams and 10 gpm on non-fish-bearing streams (S&G 110, Forest Service Region Five BMP 2.5).

Soils

S1: Operate mechanical equipment when soil moisture is less than 20 percent by weight. Use Forest Service standard contract provision Erosion Prevention and Control to suspend operations due to the rainy season, high water, and other adverse operating conditions, to protect resources (BMP 1-5). If Forest Service soil scientist or hydrologist is unavailable to sample soil, contract administrators shall use ball method to test for operability as described in the Table 3, below. Follow this protocol by digging a small pit and sampling 4 to 6 inches below the mineral soil surface (below the surface litter). Collect enough soil to form a 1- to 2-inch ball by molding with hand pressure. Pick out excessive rock fragments and squeeze with 6 directional squeezes. If a ball is formed that holds together under repeated tosses (1 to 2 feet into the air) then the soil is too wet for equipment operation.

Table 3. Protocol for Determining Machinery Operability on Soils Based on Soil Moisture.

Soil Moisture % Increases Downward	**Coarse Soils (Loamy sands, fine sandy loam, very fine sands, coarse sands)**	**Light Soils (Fine sandy loams, sandy loams, very fine sandy loam)**	**Medium Soils (less than 35% clay) Sandy clay loam, loam, silt loam, sandy clay loam, clay loam)**	**Heavy Soils (greater than 35% clay) Clay loam, sandy clay, silty clay loam, clay)**
Dry soils	Dry, loose, single grained flows thru fingers. OA[1]	Dry, loose, flows thru fingers. OA	Powdery, dry, sometimes slightly crusted but breaks down into powdery conditions. OA	Hard, baked, cracked sometimes has loose crumbs on surface. OA
Slightly Moist soil	Still appears dry, will not form a ball with pressure. OA	Still appears to be dry; will not form a ball. OA	Somewhat crumbly, but will hold together from pressure. OLGP[1]	Somewhat pliable; will form ball under pressure. At plastic limit. NO[1]

Moist soil	Still appears dry, will not form a ball with pressure. OA	Tends to ball under pressure but seldom will hold together. OLGP	Forms a ball and is very pliable, sticks readily if high in clay. NO	Easily ribbons out between fingers, has a slick feeling. At plastic limit. NO
Very moist soil	Tends to stick together slightly, sometimes forms a very weak ball. OLGP	Forms a weak ball breaks easily, will not stick. Plastic limit or nonplastic. NO	Forms a ball and is very pliable, sticks readily if high in clay. Exceeds plastic limit. NO	Easily ribbons out between fingers, has a slick feeling. Exceeds plastic limit. NO
Wet soils	Upon squeezing, free water may appear. Wet outline is left on hand. Nonplastic. NO	Upon squeezing free water may appear. Wet outline left on hand.NO	Can squeeze out free water. Wet outline left on hand. NO	Puddles and free water forms on surface. Wet outline left on hand. NO

[1] **OA** = Operable for all mechanical equipment; **OLGP** = Operable for low ground pressure equipment; **NO** = Not operable for mechanical equipment.

Off of designated skid trails, limit all equipment passes over the same piece of ground to reduce the potential for adverse soil compaction. Outside normal operating season (NOS) or during wet periods within the NOS, utilize the TNF Wet Weather Operations Guidelines.

S2: Restrict ground based mechanical equipment to slopes generally less than 30 percent. Areas within ground based mechanical treatment units with slopes over 30 percent and less than 50 percent would be identified and flagged on the ground. Within these areas trees could be directionally felled and endlined to existing skid trails which are in a stable condition (no evidence of significant erosion or slumping) and that have been flagged and evaluated for use by a soil scientist. Equipment (except for tracked masticators) would be confined to the approved skid trails. Following operations and prior to the wet season, these trails would be covered with slash as needed to prevent erosion. Areas over 30 percent slope without suitable designated skid trails would be excluded from equipment entry other than tracked masticators, unless agreed upon during site-specific consultation with a soil scientist or hydrologist.

S3: Maintain effective soil cover (post activity condition), based on soil Hydrologic Soil Group, to meet LMP S&G 55 (Tahoe LRMP pp. V-37) (see Table 4).

Table 4. Minimum Effective Percent Cover by Slope and Soil Group.

Soil Group	Percent Slope Class and Percent Soil Cover		
	<35	**35 to 50**	**>50**
A	70	80	90
B	50	60	75
C	40	50	65
D	30	40	55

S4: Till/sub-soil landings, skid trails within 200 feet of landings, temporary roads, and unauthorized routes with equipment such as a winged sub-soiler or other tilling device to a maximum depth of 24 inches so that the soil is lifted vertically and fractured laterally to alleviate detrimental compaction (where it occurs) following completion of all management activities. Tillage/sub-soiling will be completed outside of the tree drip line so as not to impact root systems. Subsoiling depth can be reduced based on compaction depth and rock fragments following consultation with Forest Service hydrologist or soil specialist.

On compacted skid trails, firelines, and temporary roads, where subsoiling does not occur, construct waterbars at specified intervals (Table 5). Compaction is defined as a reduction of total soil porosity by more than 10 percent as compared to the undisturbed soil (Tahoe LRMP pp. V-36).

Table 5. Water Bar Spacing Requirement for Skid Trails, Fire Lines, and Temporary Roads[1,2].

Road, Skid Trail or Fire Line Gradient	Erosion Hazard Rating for Area[3]			
	Low	Medium	High	Very High
%	(Feet)	(Feet)	(Feet)	(Feet)
1– 6	400	350	300	250
7–9	300	250	200	150
10–14	200	175	150	125
15–0	150	120	90	60
21–40	90	70	50	30
41–60[4]	50	40	25	15

[1]Source: Forest Service Region Five Sale Administration Handbook 2409.15; use for permanent roads where water bars are needed unless otherwise prescribed by road plans.
[2] Measure spacing on the slope.
[3] EHR's are based on general area around road or trail and not on the bare area of the road or trail.
[4] May require hand work instead of machinery.

S5: Identify environmentally sensitive areas such as Aquoll, Boroll, and Cryumbrept soil and avoid these areas with mechanical equipment when too wet as defined in S1 (Forest Service Pacific Southwest Region Best Management Practice (BMP) 1-1). Locate these areas on project map (BMP 1-4).

S6: Retain large downed woody debris at a rate of five of the largest down logs per acre (not to exceed 10 tons per acre). Logs per acre can be calculated as the average of several sample points, counted by multiplying the number within a 37-foot radius by 10. Preference is for large cull logs 20 inches or more in diameter and more than 40 cubic feet in volume. Avoid removing material to landing or burn piles.

S7. Limit tractor piling to slopes of less than 20%. Slopes between 20–30% may be considered with site-specific analysis by a watershed specialist. Comply with RCOs (SNFPA ROD, page 64, #113) for machine piling:

- Soils should be dry to 8".
- No/minimal soil in piles.
- Only incidental uprooting of shrubs.
- Keep "brush rake" out of the ground – objective is to retain the litter and duff

Terrestrial Wildlife

TW7: Retain riparian vegetation and hardwoods, such as oaks, aspen, alder, willow, and cottonwood. Some riparian and hardwood vegetation may be removed for operability or safety or as designated for meadow, aspen, and cottonwood restoration as described for the Alternative 1 and Alternative 3 (S&G 18–26).

TW8: Where feasible, retain stands of berry-producing or less common native shrub species such as elderberry (*Sambucus*), redberry (*Vaccinium, Ceanothus*), coffeeberry (*Rhamnus*), dogwood (*Cornus*), and Sierra plum (*Prunus*). Retain manzanita (*Arctostaphylos*) and mountain whitethorn (*Ceanothus cordulata*) shrubs in patches where it would not compromise fuels management goals.

TW9: Consistent with Forest Plan management direction, retain at least four of the largest snags per acre larger than 15 inches dbh. Snag numbers can be averaged over 10 acres, i.e. in clumps to provide dense snag patches and facilitate other management objectives (S&G 11).

TW10: Refer to S6 for retention of large downed woody debris for wildlife. (S&G 10 and 11).

TW11: Avoid ignition of large woody debris in units where prescribed burning is scheduled (S&G 10).

TW12: In mastication areas, avoid existing large woody debris and leave additional coarse wood on the ground (i.e., do not grind it into the ground) (S&G 10).

Water

W1: Establish Riparian Conservation Areas (RCAs) for all aquatic features, as specified in Table 6, below.

Table 6. Riparian Conservation Areas.

Stream Type	Width of the Riparian Conservation Area
Perennial Streams	300 feet each side, measured from bank-full edge
Seasonal Flowing Streams	150 feet each side, measured from bank-full edge
Streams In Inner Gorge	Top of inner gorge
Meadows, lakes, and springs	300 feet from edge of feature or riparian vegetation, whichever is greater

W2: Establish a 100-foot "riparian buffer" zone along each side of perennial streams and special aquatic features, 50-foot "riparian buffer" along each side of intermittent streams and establish a 25-foot "riparian buffer" zone along each side of ephemeral streams. No ground-based equipment is allowed in riparian buffers unless required for meadow, aspen, and cottonwood restoration, trail construction, approved skid trail or road crossings, or agreed to by a riparian specialist (S&G 92, 113).

W3: Prescribed fire plan should be developed to retain effective soil cover, coarse woody debris, and standing snags throughout the RCAs; however, short-term reductions may occur (S&G 111).

W4: No direct ignition will be conducted within riparian buffers; however, unless otherwise agreed by the Forest Service riparian specialist, hydrologist, botanist, or aquatic biologist. Fire may back in to riparian buffers. No pile burning will be conducted within the riparian buffer. Burning prescriptions should be developed to retain effective soil cover, coarse woody debris, and standing snags throughout the RCA; however short-term reductions may occur. (S&G 109).

W5: Do not apply borate compound within 25 feet of surface water, when rain is falling, or when rain is likely that day (i.e., National Weather Service forecasts 50% or greater chance of rain) (S&G 97).

W6: Leave one lane of travel at the French Meadows Boat Ramp open for recreation use during drafting from the reservoir.

W7: To the extent feasible, the amount of water drafted from French Meadows Reservoir (or other sources as approved by the Forest Service) will be documented and provided to the Forest Service Public Services Officer following each work season.

W8: At water sources where overflow runoff from water trucks or storage tanks may enter a stream, effective erosion control devices shall be installed (S&G 92).

W9: All vehicles and heavy machinery shall be checked daily and shall be repaired as necessary to prevent leaks of petroleum products from entering RCAs or water. Machinery operators shall have petroleum spill kits and know how to effectively deploy the hazardous response materials/spill kits. Dispose of absorbent pads according to the Hazardous Response Plan. Any hazardous spill event into the water shall be immediately contained and reported to the Forest Service dispatch (S&G 99).

W10: Protect all instrumentation related to water balance research from damage associated with project activities.

W11: Apply a 100-foot buffer for perennial channels and a 50-foot buffer for intermittent channels when using dust palliatives (S&G 97).

W12: Consult with the Forest Service aquatic biologist or Forest Service hydrologist prior to using existing landings or constructing new landings or roads within RCAs (S&G 113).

W13: Consult with the Forest Service hydrologist or Forest Service aquatic biologist prior to constructing temporary roads across ephemeral or intermittent drainages (S&G 113).

VI. EXISTING ENVIRONMENT, EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES, AND DETERMINATIONS

This section provides an overall characterization of the existing environment and a brief review of species eliminated from consideration, followed by a species-specific analysis and determinations for SNYLF.

Forest Stand Characteristics: The project is located within the Dolly Creek-Middle Fork American River watershed, bounded by Red Star Ridge to the northwest, Mildred Ridge to the east, and the TNF boundary to the south. The project surrounds French Meadows Reservoir, approximately 20 miles northeast of Foresthill, California. The 27,623-acre project area ranges from 5,200 to 7,300 feet in elevation. Current forest stand characteristics vary by elevation and aspect within the project area. The westernmost portion of the project area was affected by the 2001 Star Fire and is variably covered by brush, replanted trees, or natural regeneration. At lower elevations in the project area, stands are primarily Sierra mixed conifer with a proportionately larger component of fir trees as elevation increases. At the highest elevations, mostly in the northeastern and eastern portions of the project area, the vegetation transitions to red fir dominated stands. South facing aspects have proportionately more mixed conifer, and the north facing slopes have more true fir. Much of the area has a history of timber harvest, primarily individual tree selection and salvage treatments with smaller areas of clear-cuts dating back to the 1980s. Most of the area is characterized by heavy surface fuel loadings and dense understory trees.

Several large, stand replacing wildland fires have occurred in or adjacent to the project vicinity in recent years, including the Star Fire (17,000 acres; 2001), Ralston Fire (8,422 acres; 2006), American River Complex Fire (20,541 acres; 2008), American Fire (27,440 acres; 2013), and the King Fire (97,700 acres; 2014).

Fire Suppression and Logging Practices: Areas considered for treatment under the proposed action have substantially departed from their natural structure and tree species composition. These conditions are primarily due to fire suppression and past logging practices. Studies indicate that historically canopy cover and tree density was lower on average in mixed conifer landscapes compared to current conditions (Collins et al. 2011, Gutierrez et al. 2017) and forest structure was more heterogeneous due to frequent fires exhibiting low and moderate severity effects.

The existing condition of forested areas is one of overly dense stands of trees, with a large component of small shade tolerant white fir. Trees growing closely together compete for soil nutrients and water, resulting in slower growth and higher risk of becoming weakened and susceptible to insect infestation, pathogens, and drought-induced tree mortality. In addition, dense stands of small trees are vulnerable to high-severity wildfire. Most of the younger plantations in the project area were planted 11 to 30 years ago. These plantations are excessively stocked with relatively small conifers up to 11 inches diameter at breast height (dbh) and are at risk of loss due to high-intensity wildfire.

Stand conditions in the French Meadows Project area have been significantly altered by human activities since the 1880s. Historically, canopy cover was lower on average as compared to current canopy cover averages and forest structure was more heterogeneous with approximately 92 trees per acre. A significant change identified across the landscape is an increase in the percentage of trees in the 4- to 11-inch size class for all conifer species, with white fir having the greatest percentage (57%) of small stems. Since the early 1900s, fire suppression policy has excluded most wildfire from the area. The trend towards the presence of more shade-tolerant trees in forest stands in the French Meadows Project area is ongoing.

Past logging practices have also influenced stand conditions in the French Meadows Project area. Numerous plantations were established as a result of even-aged management activities. Established in the 1980s and 1990s, they are generally comprised of mixed-conifer species with a heavy brush component. Two older plantations established in the 1970s contain predominantly pine species. These plantations cover a total of approximately 11% of the overall project area. Historic logging in the French Meadows Project area was primarily associated with mining activity. Typically, the largest, most accessible yellow and white pines were cut to meet the timber demands of the mines. Several small, localized mills were located throughout the area to service those needs.

Insects and Disease: Native insects and pathogens of forest trees perform important functions in natural ecosystems; killing trees, creating dead and down woody habitat, recycling nutrients, and creating gaps for regeneration. Under historic disturbance regimes in Sierra mixed-conifer forests, these organisms remained at levels where they did not cause rapid, large-scale changes in the structure or composition of the forest. Several insects and diseases are common in the project area, including the fir engraver, heterobasidion root disease, dwarf mistletoe, and white pine blister rust.

SPECIES ELIMINATED FROM FURTHER ANALYSIS

The French Meadows Project would not affect species that do not occur or have not suitable habitat within the analysis area. This includes: Delta smelt, Lahontan cutthroat trout, and California red-legged frog. The project area is outside the range of these species. Therefore, the project would not result in effects to these species and they are not analyzed further in this document.

SPECIES-SPECIFIC ANALYSIS AND DETERMINATIONS

This section provides a brief overview of the areas of analysis and analysis methods; describes the existing environment for SNYLF; analyzes the effects of the proposed action and alternatives, and provides the conclusions and determinations.

The existing environment includes species life history, status, and relevant information. Further detail can be found in the SNFPA Final Environmental Impact Statement and ROD (USDA Forest Service 2001) and SNFPA 2004 ROD and Final Supplemental Environmental Impact Statement (USDA Forest Service 2004).

The effects of the proposed action and alternatives are described as direct, indirect or cumulative. Direct effects as described in this evaluation refer to mortality or disturbance that results in flushing, displacement or harassment of the animal. Indirect effects refer to modification of habitat and/or effects to prey species. Cumulative effects represent "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (NEPA 1986).

If the cumulative effects involve a federally listed species, the definition of cumulative effects expands to address "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (ESA, 1973 as amended).

For NEPA, "Connected action" as defined in CEQ Section 1508.25(a):

> Actions are connected if they: (1) automatically trigger other actions which may require environmental impact statements; (2) cannot or will not proceed unless other actions are taken previously or simultaneously, or; (3) are interdependent parts of a larger action and depend on the larger action for their justification.

Regulations at 50 CFR 402.02 in regards to federally listed species are as follows:

> Effects of the action refers to the direct and indirect effects of an action on the species or Critical Habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Section C provides a summary of supporting conclusions and the statement of determination for each species based upon relevant information provided in Sections A & B.

Analysis Methods

Direct and Indirect Effects—Area of Analysis and Methods

The area of analysis for direct and indirect effects is defined as the French Meadows Project area. The following datasets, clipped to the TNF, were used for developing Geographic Information Systems data for the analysis:

- U.S. Geological Survey National Hydrography Dataset
- USFWS National Wetlands Inventory
- UC Davis Sierra Nevada Multi-Source Meadow Polygons Compilation, v 1.0
- Forest Service National Wildlife Database, accessed March 9, 2017

RCAs and riparian buffers were delineated as described in management requirements W1 and W2 (Section V). SNYLF suitable habitat is defined to include permanent water bodies (including perennial and intermittent streams and wet meadows/pond habitats) above 4,500 feet in elevation, and adjacent uplands to a distance of 25 meters (82 feet). This definition is consistent with GIS datasets developed for the Programmatic BA/BO (USFWS 2014b) and with the USFWS definition developed as part of its designation of SNYLF Critical Habitat (USFWS 2016).

Refer to Figure 2 for the location and extent of RCAs and SNYLF suitable habitat in the project area.

Cumulative Effects—Area of Analysis and Methods

The area of analysis for cumulative effects includes the project area plus a 2-mile buffer, encompassing the maximum documented upstream/downstream movements of SNYLF (Matthews and Pope 1999; Wengert 2008). Note that Critical Habitat Subunit 2D, Five Lakes is located in the Granite Chief Wilderness approximately 3 miles east of the project boundary, just outside the area of analysis for cumulative effects. The cumulative effects analysis area is large enough to encompass the known home ranges of species being analyzed, yet not so large as to mask any potential effects of the proposed action. Past, present, and reasonably foreseeable future actions on forest land that have or will occur within the project area are provided in Appendix D. It is likely that other projects will occur within the analysis area in the foreseeable future, but they have not yet been developed and therefore are not considered.

Existing Environment

On January 10, 2003 (and as revised on June 25, 2007) the USFWS found that listing of the SNYLF as threatened or endangered was warranted but precluded by higher priority actions and the species was listed as a Candidate (USFWS 2003; 68 FR 2283 and revised by USFWS 2007; 72 FR 34657). A separate disjunct population, the southern California distinct population segment (DPS) of the mountain yellow-legged, was listed as Endangered by the USFWS effective August 1, 2002 (USFWS 2006a; 67 FR 44382), and Critical Habitat was designated for the southern California DPS on October 16, 2006 (USFWS 2006b; 71 FR 54344). On April 29, 2014, the U.S. Fish and Wildlife Service published a final rule in the Federal Register to list the SNYLF and Northern DPS mountain yellow-legged frogs as endangered with extinction (USFWS 2014). The rule went into effect on June 30, 2014. A critical habitat designation was proposed by the USFWS (2013) and was finalized as of August 26, 2016.

Taxonomy*:* The mountain yellow-legged frog was once considered two subspecies of the *Rana boylii* group, with one of the subspecies in southern California which was disjunct from the one in the Sierra Nevada, and was later described as a single species, *Rana muscosa*. Genetic analysis conducted by Macey et al. (2001) indicated that there were at least four evolutionarily distinct units within *Rana muscosa*, and two major clades that diverged approximately 2.2 million years ago; one in the northern and central Sierra Nevada, and one in the southern Sierra Nevada and southern California. Recent genetic analysis combined with morphological and acoustic studies have described *Rana muscosa* as two separate species, *Rana muscosa* (mountain yellow-legged frog) and *Rana sierrae* (SNYLF). Vredenburg et al. (2007) found no overlap in the ranges of the two species that they described, but their ranges come very close to each other in the southern Sierra Nevada, with *Rana sierrae* to the north and *Rana muscosa* to the south including the disjunct southern California population (Vredenburg et al. 2007).

Distribution and Habitat Relationships: SNYLF can be found on the El Dorado, Inyo, Lassen, Plumas, Sierra, Stanislaus, Tahoe and Lake Tahoe Basin National Forests. This species is found from around 4,500 feet to over 12,000 feet elevation, and inhabit ponds, lakes, and streams of sufficient depth for

overwintering (Jennings and Hayes 1994). Yellow-legged frogs[1] are highly aquatic, utilizing only the immediate bank and emergent rocks and logs. Their preferred aquatic habitat consists of stream or lakes with a gentle slope such that at the shore there is shallow warm water. Historically streams with a bank of less than 10 inches in vertical height with a moderately rocky, sparsely vegetated bank harbored the densest populations (Mullally and Cunningham 1956).

Critical Habitat was defined by the USFWS (2016) using current and historic detections (yellow-legged frogs that have been confirmed since 1995) and modeling important habitat attributes (MaxEnt 3.3.3e) to produce the likelihood of frog occurance. Dr. Knapp's model (MaxEnt 3.3.3e) used nine environmental factors to determine likelihood of frog occurrence which include; elevation, max. elevation of unit watershed, slope, average annual temperature, average temperature of the warmest month of the year, annual precipitation, precipitation during the driest month of the year, distance to water, and lake density. The USFWS defines primary habitat requirements as follows:

"Based on our current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, we determine that the primary constituent elements specific to the SNYLF and the northern DPS of the mountain yellow-legged frog are:

> (1) *Aquatic habitat for breeding and rearing.* Habitat that consists of permanent water bodies, or those that are either hydrologically connected with, or close to, permanent water bodies, including, but not limited to, lakes, streams, rivers, tarns, perennial creeks (or permanent plunge pools within intermittent creeks), pools (such as a body of impounded water contained above a natural dam), and other forms of aquatic habitat. This habitat must:(a) For lakes, be of sufficient depth not to freeze solid (to the bottom) during the winter (no less than 1.7 meters (5.6 feet), but generally greater than 2.5 meters (8.2 feet), and optimally 5 meters (16.4 feet) or deeper (unless some other refuge from freezing is available)). (b) Maintain a natural flow pattern, including periodic flooding, and have functional community dynamics in order to provide sufficient productivity and a prey base to support the growth and development of rearing tadpoles and metamorphs. (c) Be free of introduced predators. (d) Maintain water during the entire tadpole growth phase (a minimum of 2 years). During periods of drought, these breeding sites may not hold water long enough for individuals to complete metamorphosis, but they may still be considered essential breeding habitat if they provide sufficient habitat in most years to foster recruitment within the reproductive lifespan of individual adult frogs.(e) Contain: (i) Bank and pool substrates consisting of varying percentages of soil or silt, sand, gravel, cobble, rock, and boulders (for basking and cover); (ii) Shallower microhabitat with solar exposure to warm lake areas and to foster primary productivity of the food web; (iii) Open gravel banks and rocks or other structures projecting above or just beneath the surface of the water for adult sunning posts; (iv) Aquatic refugia, including pools with bank overhangs, downfall logs or branches, or rocks and vegetation to provide cover from predators; and (v) Sufficient food resources to provide for tadpole growth and development.
>
> (2) *Aquatic nonbreeding habitat (including overwintering habitat).* This habitat may contain the same characteristics as aquatic breeding and rearing habitat (often at the same locale), and may include lakes, ponds, tarns, streams, rivers, creeks, plunge pools within intermittent creeks, seeps, and springs that may not hold water long enough for the species to complete its aquatic life cycle. This habitat provides for shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and

[1] The term "yellow-legged frog" is used in this Existing Environment section where the reference is inclusive of both SNYLF and mountain-legged frog or when the species reference is unclear.

adult mountain yellow-legged frogs. Aquatic nonbreeding habitat contains: (a) Bank and pool substrates consisting of varying percentages of soil or silt, sand, gravel, cobble, rock, and boulders (for basking and cover); (b) Open gravel banks and rocks projecting above or just beneath the surface of the water for adult sunning posts; (c) Aquatic refugia, including pools with bank overhangs, downfall logs or branches, or rocks and vegetation to provide cover from predators; (d) Sufficient food resources to support juvenile and adult foraging; (e) Overwintering refugia, where thermal properties of the microhabitat protect hibernating life stages from winter freezing, such as crevices or holes within bedrock, in and near shore; and/or (f) Streams, stream reaches, or wet meadow habitats that can function as corridors for movement between aquatic habitats used as breeding or foraging sites.

(3) *Upland areas*. (a) Upland areas adjacent to or surrounding breeding and nonbreeding aquatic habitat that provide area for feeding and movement by mountain yellow-legged frogs. (i) For stream habitats, this area extends 25 meters (82 feet) from the bank or shoreline. (ii) In areas that contain riparian habitat and upland vegetation (for example, mixed conifer, ponderosa pine, montane conifer, and montane riparian woodlands), the canopy overstory should be sufficiently thin (generally not to exceed 85 percent) to allow sunlight to reach the aquatic habitat and thereby provide basking areas for the species. (iii) For areas between proximate (within 300 meters (984 feet)) water bodies (typical of some high mountain lake habitats), the upland area extends from the bank or shoreline between such water bodies. (iv) Within mesic habitats such as lake and meadow systems, the entire area of physically contiguous or proximate habitat is suitable for dispersal and foraging. (b) Upland areas (catchments) adjacent to and surrounding both breeding and nonbreeding aquatic habitat that provide for the natural hydrologic regime (water quantity) of aquatic habitats. These upland areas should also allow for the maintenance of sufficient water quality to provide for the various life stages of the frog and its prey base." (USFWS 2016).

Yellow-legged frogs primarily feed on aquatic and terrestrial invertebrates along the shoreline and on the water surface (Vredenburg et al. 2005), while larvae feed on benthic algae and detritus (Knapp et al. 2003). Pope and Matthews (2001) noted that seasonal movements appeared to be correlated to the abundance of Pacific tree frog larvae, a prey species of adult yellow-legged frogs. Pope and Matthews (2002) found that abundance of tree frog larvae in a water body as a source of prey positively influenced the condition of yellow-legged frogs, especially important leading into winter. Pope and Matthews (2002) also analyzed species occurrence data of lakes across the John Muir Wilderness and Kings Canyon National Park, and found that adult yellow-legged frogs were more abundant in lakes with other frog species than in lakes with no other frog species, and suggested this pattern was due to other frog species' larvae used as a food source.

Overwintering, Spring, and Summer Habitat*:* All age classes (subadult and adult frogs, and larvae) overwinter underwater; in high elevations they are restricted to relatively deep lakes (over 5 feet deep) that do not freeze solid in winter (Knapp 1994, Knapp and Matthews 2000). Frogs (subadults and adults) hibernate underwater in winter; winterkill of subadults and adults may occur due to oxygen deprivation over winter under ice, while larvae are more resistant (Bradford 1983). Larvae require 2 to 4 years to metamorphose, and thus require water bodies which do not dry in summer (Knapp and Matthews 2000). At least some of the population overwinters in shallow lakes (<1.5 m) that likely freeze to the bottom most years. These frogs likely avoid freezing by utilizing underwater crevices (Pope and Matthews 2001). Frogs utilize near shore ledges and crevices in fractured bedrock along the shoreline which are close to the water's surface (0.2 to 1m). These crevices are typically very narrow, but may open to larger areas deeper within the rock and often contain multiple individuals indicating that this species overwinters in aggregations. Both aggregations and the surrounding granite likely insulate individual animals from

temperature extremes throughout the winter (Matthews and Pope 1999). Site fidelity is high for breeding, foraging and overwintering for this species (Matthews and Preisler 2010).

Breeding occurs soon after spring thaw, ranging from April at lower elevations to June or July in high elevations (Vredenburg et al. 2005). During spring thaw, frogs emerge to the surface to bask in the sun, or travel over ice and snow to other nearby bodies of water (Pope and Matthews 2001), while larvae seek warmer water near shore (after spring turnover in large bodies of water) (Bradford 1984). Yellow-legged frogs lay their eggs in clusters submerged in shallow areas (Bradford 1983), under banks or attached to rocks, gravel, or vegetation (Vredenburg et al. 2005). The length of the larval stage depends on elevation; larvae require at least one year before metamorphosis to the adult stage, but most Sierra Nevada populations are composed of larvae in three size classes which may correspond to year classes (Vredenburg et al. 2005). Metamorphosis occurs in July or August (Vredenburg et al. 2005). The time required to reach reproductive maturity is believed to vary between 3 and 4 years after metamorphosis (Vredenburg et al. 2005), and adult survivorship is very high (Matthews and Pope 1999).

During summer, frogs and larvae seek the warmest thermal regimes throughout the day and night (Bradford 1984). Adults are rarely far from water, usually less than 1 meter and almost always on a wet substrate while basking, typically from sunrise into late morning (Bradford 1984). Bradford (1984) observed daily movements of adults corresponding to areas of warmer temperatures; in morning they basked in sun, were in water near shore from mid-day until nightfall, and submerged in warmer deeper water for most of the night, usually under rocks or in crevices. Larvae exhibited similar selection for warmer temperatures throughout the day and night, as well as seasonally; they stay in deeper, warmer water below the thermocline until spring turnover, at which time they move to shallow water near the shoreline for the daytime and deeper, warmer water at night (Bradford 1984). Highest summer densities and overall total numbers are found in lakes lacking introduced fish, possessing high numbers of Pacific tree frog (*Pseudacris regilla*) tadpoles, more than 1 meter in depth and near-shore habitat with warm water temperatures (Pope and Matthews 2001).

Seasonal Movement and Dispersal*:* In a relatively small basin (0.4 mi^2) with numerous small lakes and stream segments in Kings Canyon National Park, Matthews and Pope (1999) and Pope and Matthews (2001) observed seasonal movement patterns that coincided with changes in activity from overwintering habitat to breeding and feeding habitat and back again to overwintering habitat. Pope and Matthews (2001) observed frogs moving between nearby lakes over snow and ice during the spring thaw, and one frog was found wandering upslope about 200 feet from the basin water bodies on snow. Frogs were also observed moving overland in late summer to disperse to other nearby aquatic habitats, likely in response to reduced prey availability; some individuals moved overland for distances of at least 466 feet to other nearby aquatic habitats as summer progressed (Pope and Matthews 2001). A study by Finlay and Vredenburg (2007) in the Sixty Lakes Basin (approximately 12 mi^2 study area) in Kings Canyon National Park where there are numerous water bodies in close proximity to each other suggests that when small lakes and ponds are used for breeding, frogs may leave these areas for other nearby aquatic habitats that lack yellow-legged frog larvae. Matthews and Pope (1999) found that frogs tended to be relatively stationary in August when feeding appeared important and were often found in the open, then moved to overwintering locations in September, and were stationary by the end of October under ledges and in rock crevices and rarely in the open.

Threats*:* Once abundant in aquatic ecosystems of the mid to high elevation Sierra Nevada from southern Plumas County to southern Tulare County (Jennings and Hayes 1994), the yellow-legged frog has undergone a range-wide decline in the Sierra Nevada (USFWS 2003). Over 90% of historically occupied sites in the Sierra Nevada are now unoccupied (Vredenburg et al. 2007).

The decline of yellow-legged frogs in the Sierra Nevada has largely been attributed to the introduction of salmonid fishes during the last century (USFWS 2003). More recently, the disease chytridiomycosis has emerged as a significant threat to the species (Briggs et al. 2005, Oullet et al. 2005, Wake and Vredenburg 2008). Additional reasons for the yellow-legged frogs decline or contributing factors include airborne pesticides (Davidson et al. 2002, Davidson 2004, Davidson and Knapp 2007), loss of habitat, altered habitat, and grazing (USFWS 2003). Davidson and Knapp (2007) evaluated over 6800 sites in the southern Sierra Nevada comparing yellow-legged frog occupancy with presence of introduced fish, habitat conditions, and predicted exposure to airborne pesticides from agricultural lands upwind in California's Central Valley, and found that airborne pesticides appeared to have a pronounced negative effect on yellow-legged frog occupancy independent of the other factors examined.

Predation*:* Predators known to consume yellow-legged frogs include garter snakes (*Thamnophis spp.)* (Mullally and Cunningham 1956), and eared grebes which prey on both tadpoles and small frogs (Fellers et al. 2007). In at least one instance an entire year's worth of metamorphosing offspring were consumed by Brewer's blackbirds (Bradford 1991).

Introduction of non-native fishes are a major threat to this species. Prior to stocking, fish were generally historically absent from the middle to high elevations in the Sierra Nevada (Hayes and Jennings 1986, Bradford et al. 1993, Knapp 1996). Both distribution and abundance of yellow-legged frog larvae are significantly reduced when trout are introduced to an area (Knapp et al. 2001). When fish are removed from an area, frog populations immediately begin to recover regardless of other habitat conditions (Knapp et al. 2001; Knapp et al. 2007). Additionally, when fish are removed, the larvae numbers mirror larvae numbers in lakes where fish were never introduced (Knapp et al. 2001).

The long larval stage for the yellow-legged frog makes it extremely vulnerable to predation by fish, where it must overwinter under ice generally two to three times before metamorphosis (Bradford 1989, Vredenburg et al. 2005). Finlay and Vredenburg (2007) found that densities of larvae and frogs were significantly higher in fishless lakes than those with trout. Fish also greatly reduce the availability of prey to adult frogs, which only forage on aquatic invertebrates when they are at the water surface or near the shoreline (Finlay and Vredenburg 2007).

Disease*:* Disease is a major source of concern for yellow-legged frogs. Two diseases are particularly hard on this species. The first is known as "red-leg" disease and is caused by the bacterium *Aeromonas hydrophila*. Animals with this disease are emaciated, sluggish, poorly coordinated and the ventral surfaces of limbs are abnormally red due to hemorrhage and enlarged capillaries. "Red-leg" disease is attributed to the die-off of approximately 800 adult frogs at a single location over the timespan of a single season (Bradford 1991). It should be noted that although "red-leg" disease is attributed to that die-off; the diagnosis was made before amphibian chytridiomycosis was well known and the die off may have been the result of a combination of both diseases or the result of only one of the two diseases. This second disease, amphibian chytridiomycosis, is caused by the fungus *Batrachochydrium dendrobatidis* (Bd). Chytridiomycosis is an emerging infection disease which has caused numerous declines and possible extinctions of amphibians globally. Yellow-legged frogs are well documented as being sensitive to this disease. Animals are able to acquire Bd zoospores by simply being in an infected lake, frog–frog contact is not required (Rachowicz and Briggs 2007). Although Bd is considered a primary cause for many of the disappearances of yellow-legged frogs, some populations can coexist with the fungus. These populations have a significantly larger proportion of anti-Bd bacterial species than populations that went extinct shortly after the appearance of Bd in the area. This is indicative of herd immunity where populations with a high proportion of individuals protected by bacteria limits the survival of the disease and thus prevents

epidemic outbreaks in that population (Lam et al. 2010; Woodhams et al. 2007). At least 83% of all known sites currently have Bd present (Knapp et al. 2011).

***Local Information**:* SNYLF have been historically documented in a number of locations in the TNF, but now exist in only a few populations in ponds and streams and generally in small numbers (USFWS 2003, the TNF GIS database). Jennings and Hayes (1994) indicate that the species was eliminated by 1992 in many locations based on re-surveys of historic locations.

The TNF initiated herpetological surveys in 1996 in cooperation with the California Academy of Sciences, which included areas likely to support yellow-legged frogs. These surveys continued through 1999, and included a systematic search of historical museum records for the four counties encompassing the TNF (Vindum et al. 1997, Vindum and Koo 1999a, Vindum and Koo 1999b). The review of historical herpetological specimens found that yellow-legged frogs were historically collected from 33 localities in the TNF (Vindum et al. 1997). During ensuing surveys from 1997–1999, yellow-legged frogs were found in two additional localities (Vindum et al. 1997, Vindum and Koo 1999a, Vindum and Koo 1999b). Yellow-legged frog surveys were also conducted in cooperation with the USGS Biological Division, Pt. Reyes, from 1997 through 2000, and continue periodically (data on file with the TNF). Since 1997, yellow-legged frog sightings have been routinely recorded, either incidentally during stream and other biological surveys or during amphibian-focused surveys.

The TNF GIS database shows that since 1993 there have been SNYLF documented in 4 general localities on Truckee Ranger District, 6 general localities on Sierraville Ranger District, and 10 general localities on Yuba River Ranger District. no extant populations have been documented on the American River Ranger District. The California Natural Diversity Database (CNDDB) reports several additional occurrences within the TNF, primarily to the east and north of the project area (CDFW 2018).

The Forest-wide S&Gs associated with RCAs (Nos. 91–94) and those associated with RCOs (Nos. 95–124) in the SNFPA ROD (USDA Forest Service 2004) are intended to maintain the function and integrity of riparian habitats upon which SNYLF rely.

***Sierra Nevada Yellow-Legged Frog Populations and Habitat in the Project Area**:* Table 7, below, summarizes (in miles and/or acres) the extent of suitable habitat for this species within the French Meadows Project area. For the purposes of this analysis (and consistent with the USFWS definition), suitable habitat is defined to include permanent water bodies (including perennial and intermittent streams and wet meadows/pond habitats) above 4,500 feet in elevation, and adjacent areas up to a distance of 25 meters (82 feet). Refer to Figure 2 for the location of potential habitat within the project area.

Table 7. Miles and Acres of Suitable Habitat >4,500 feet for SNYLF within Subwatersheds of the French Meadows Project Area.

12-Digit Hydrologic Unit Subwatershed Name (and Associated Drainages)	SNYLF Suitable Habitat					Total	
	Stream (Perennial)		Stream (Intermittent)		Wetland/ Meadow		
	Miles	Acres[1]	Miles	Acres[1]	Acres[1]	Miles[2]	Acres[3]
Dolly Creek-Middle Fork American River (180201280302)							
French Meadows Reservoir	1.17	23.97	11.18	224.19	0	12.35	248.15
Middle Fork American River-Chipmunk Creek	0.53	15.93	0.44	8.95	0	0.97	24.88
Middle Fork American River-Dolly Creek	10.40	214.32	2.76	54.88	21.64	13.17	290.84
Middle Fork American River-Rice Creek	15.45	308.32	8.71	172.33	23.43	24.16	504.08
Middle Fork American River-Talbot Creek	5.86	116.43	4.43	86.56	1.24	10.29	204.22
Hell Hole Reservoir -Rubicon River (180201280203)							
Hell Hole Reservoir	5.20	103.39	0.19	3.36	43.58	5.39	150.34

Lower Five Lakes Creek	0.58	11.43	0.84	16.77	8.32	1.42	36.52
Long Canyon (180201280208)							
South Fork Long Canyon Creek	1.94	38.82	0.04	1.11	3.53	1.98	43.46
	41.13	**832.61**	**28.61**	**568.15**	**101.74**	**69.74**	**1502.50**

[1]Acreage includes a 25-meter (82-foot) upland buffer around aquatic habitats.
[2]Total of perennial and intermittent stream miles.
[3]Total acreage for perennial streams, intermittent streams, and wetlands/meadows, inclusive of 82-foot upland buffer.

The French Meadows Project is located between approximately 5,300 and 7,200 feet in elevation, which is within the elevation range (i.e., 4,500 feet and higher) for SNYLF. Within the project area there are a total of 41.13 miles/832.61 acres of perennial stream channel habitat and 101.74 acres of wet meadow and pond habitat that could potentially be used for SNYLF breeding. In addition, there are 28.61 miles/568.15 acres of seasonal stream habitat that could be used for dispersal and migration corridors. These habitats are not known to be occupied.

As part of the relicensing of its Middle Fork American River Project (MFP), PCWA conducted extensive fish population, geomorphic, and riparian technical studies in project bypass reaches above 4,500 feet msl, including the Middle Fork American River above French Meadows Reservoir. Incidental observations of special-status amphibians were recorded during implementation of these surveys. No SNYLF individuals were observed (PCWA 2011; Federal Energy Regulatory Commission [FERC] 2012; FERC 2013). Of the recorded occurrences of SNYLF in the vicinity of the project, depicted in Figure 3, the nearest is approximately 1 mile northeast of the project area, where between 5 and 25 individuals were identified by Forest Service biologists in 1997, 1998 and 2008 (TNF GIS database, CNDDB 2018). In addition, there are several known populations of SNYLF in high-elevation pond habitats within Critical Habitat Subunit 2D, Five Lakes, approximately 3 miles east of the project area. SNYLF individuals typically travel in or along aquatic corridors, and researchers have documented maximum upstream/downstream movements up to approximately 2 miles (Matthews and Pope 1999; Wengert 2008). Therefore, it is possible that individuals from existing populations could move into the project area.

Figure 2. Sierra Nevada Yellow-Legged Frog Suitable Habitat.

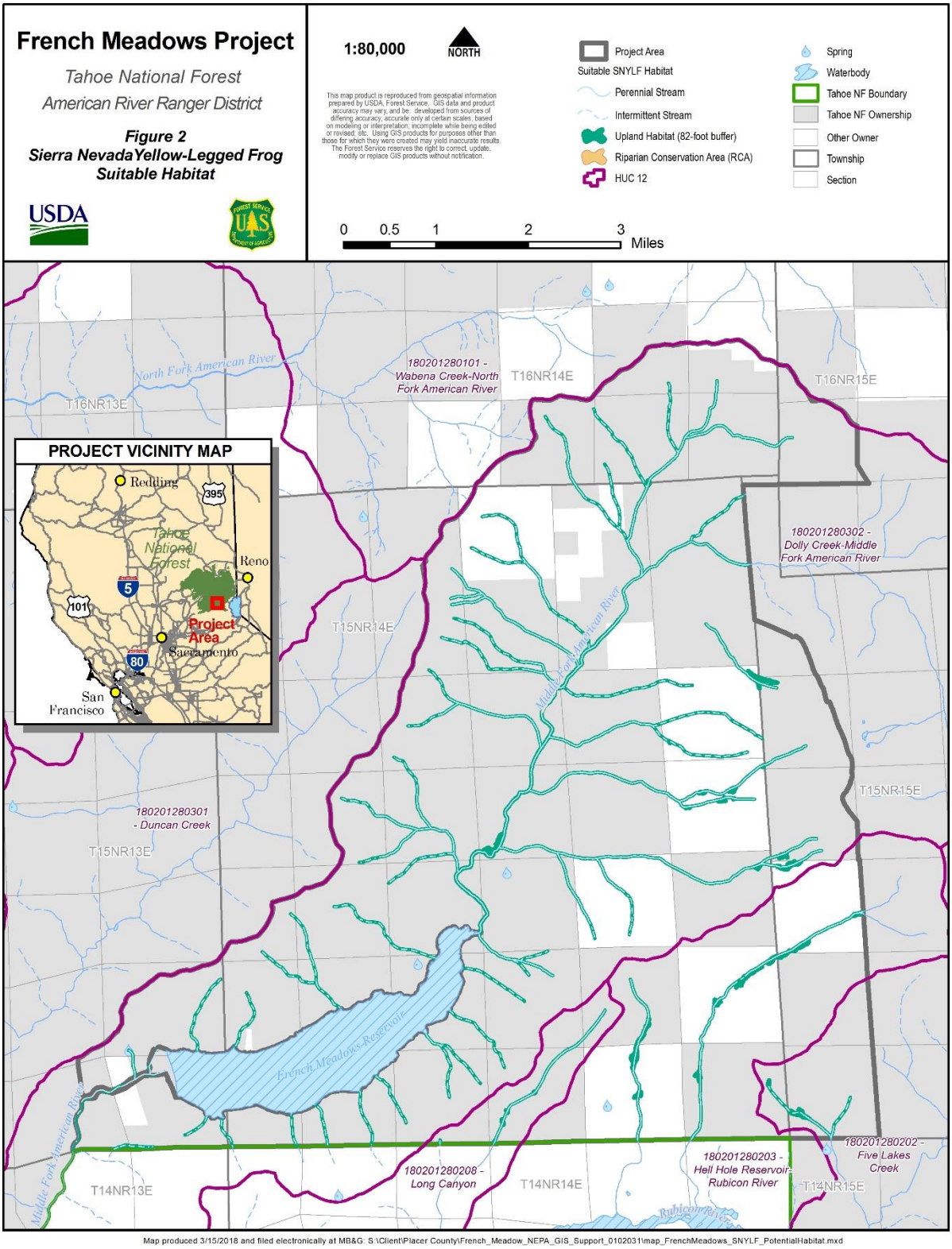
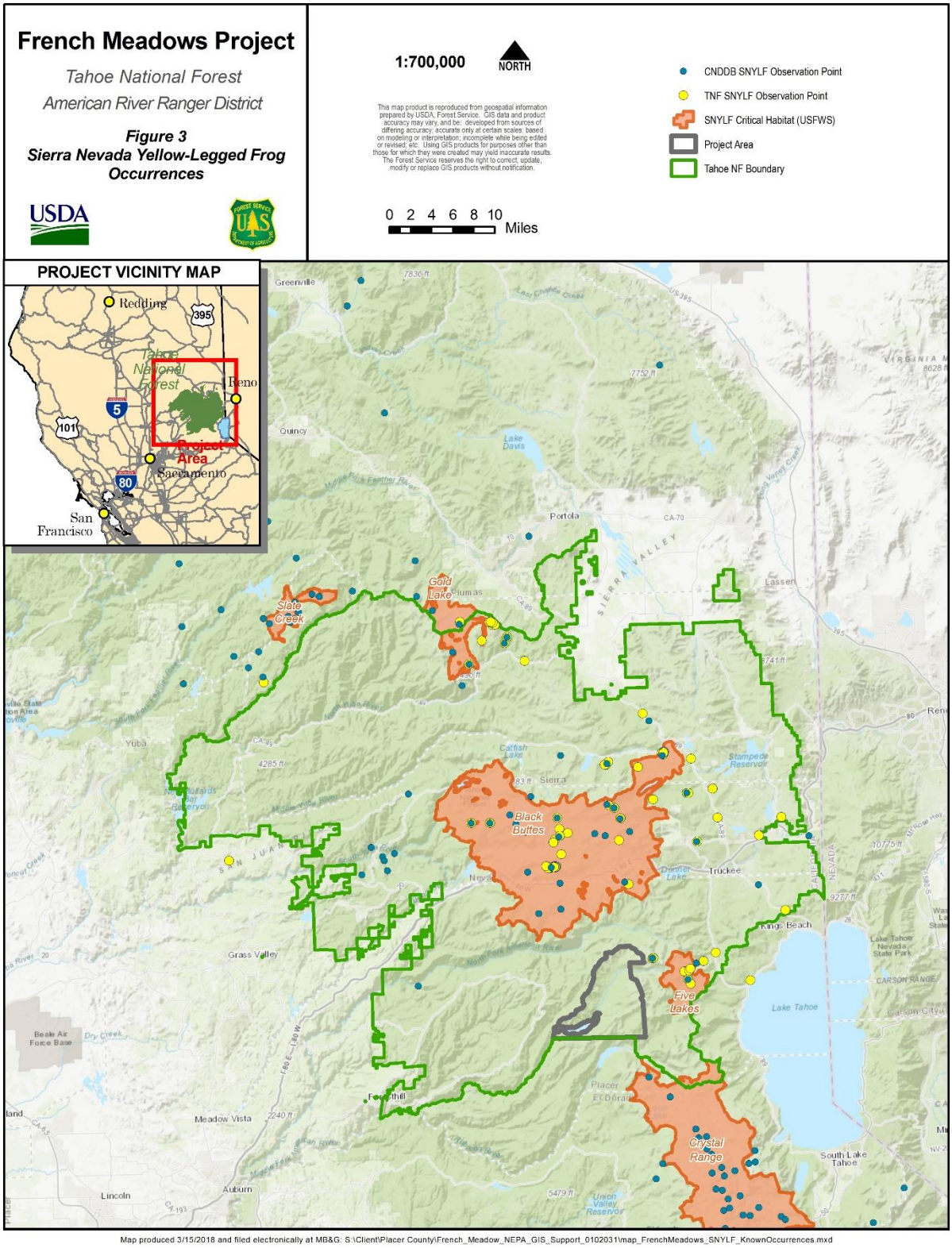
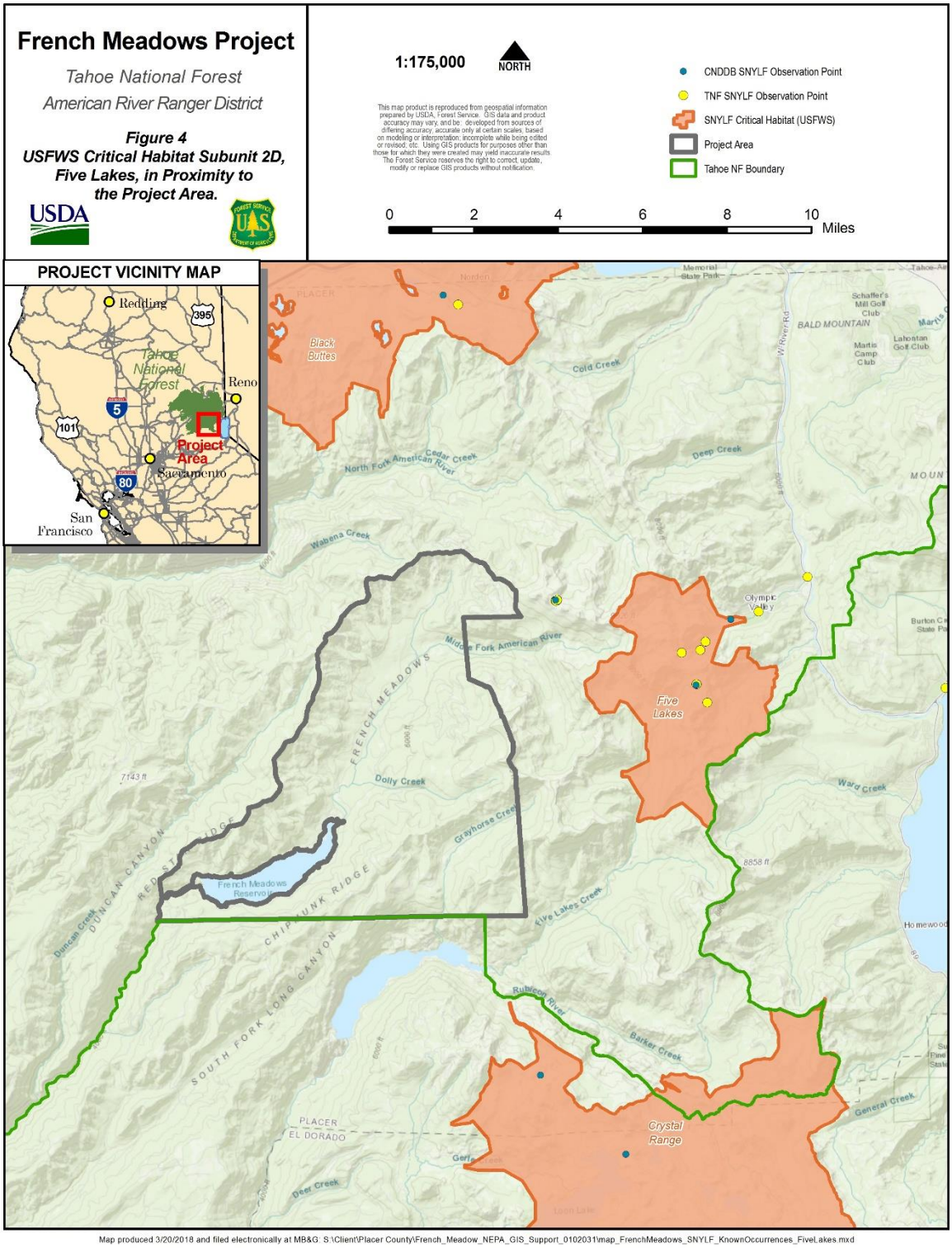


Figure 3. Sierra Nevada Yellow-Legged Frog Occurrences.



Map produced 3/15/2018 and filed electronically at MB&G: S:\Client\Placer County\French_Meadow_NEPA_GIS_Support_0102031\map_FrenchMeadows_SNYLF_KnownOccurrences.mxd

Figure 4. USFWS Critical Habitat Subunit 2D, Five Lakes, in Proximity to the Project Area.



Map produced 3/20/2018 and filed electronically at MB&G: S:\Client\Placer County\French_Meadow_NEPA_GIS_Support_0102031\map_FrenchMeadows_SNYLF_KnownOccurrences_FiveLakes.mxd

Under the programmatic consultation with USFWS, guidelines for conducting surveys include three visits within the past 10 years to determine if habitat is being "utilized" by this species. In the absence of these surveys, habitat is considered to have unknown utilization above 4,500 feet in elevation within the project area.

Effects of the Proposed Action and Alternatives

This section describes direct, indirect, and cumulative effects to SNYLF under the proposed action (Alternative 1), the No Action Alternative (Alternative 2), and Alternative 3. There is no designated Critical Habitat within the project area or the area of analysis for cumulative effects. Therefore, the proposed action and alternatives will have no direct, indirect, or cumulative effects on Critical Habitat, including primary constituent elements.

Proposed Action (Alternative 1)

Direct Effects

The proposed action is not expected to have direct impacts on SNYLF individuals. While occupancy of suitable habitat in the project area is considered "unknown" based on lack of protocol surveys, no SNYLF have been documented during other surveys completed in the project area. There is some potential for individuals from occupied habitats outside the project area (but within the watershed) to disperse into the project area. Such individuals, if present during project implementation, could be directly impacted by 1) contact with ground-based equipment used for forest treatments or road/trail work, as well as impacts from felled trees, 2) burning, desiccation, or other injury from prescribed fire, 3) entrapment in plastic monofilament or other tightly woven netting if used for erosion control purposes, 4) exposure to borate compound used to treat live cut stumps of conifers or to chemicals used in dust palliatives, and 5) tadpoles and/or egg masses coming into contact with water drafting equipment. Each of these potential impacts is discussed below.

Ground-Based Equipment/Felled Trees: The proposed action includes thinning of trees using ground-based equipment. In addition, ground-based equipment would be used for maintenance/reconditioning of existing roads, construction of temporary spur roads, and construction of a new 5-mile trail along the south-southeast side of French Meadows Reservoir. No direct impacts to SNYLF from ground-based equipment or felled trees are anticipated for several reasons. First, suitable habitat in the project area is not known to be occupied. While individuals could potentially move downstream into aquatic habitats from outside the project area, research has shown SNYLF to be highly associated with water—SNYLF are rarely found outside water. Therefore, any movement of SNYLF is likely to be restricted to waterways. Movement over land and away from water is most likely to occur when SNYLF are in search of potential breeding sites during warm periods in early spring, often when there is still snow on the ground and the soil is wet. When soil conditions become dry, frogs are typically restricted to aquatic habitats. As required by management requirement S1, mechanical equipment would be operated only in dry conditions when soil moisture is less than 20 percent by weight, and work activities would cease during rain events or other adverse operating conditions. Therefore, SNYLF would not likely be present in upland areas during dry soil conditions when ground-based mechanical equipment would be operated.

In the unlikely event that SNYLF are present in upland areas during implementation of forest treatments, management requirements for water resources would further minimize the potential for impacts. These include:

- Establish RCAs for all aquatic features (W1).

- Establish a 100-foot "riparian buffer" zone along each side of perennial streams and special aquatic features, 50-foot "riparian buffer" along each side of intermittent streams and establish a 25-foot "riparian buffer" zone along each side of ephemeral streams. No ground based equipment is allowed in riparian buffers unless required for meadow, aspen, and cottonwood restoration, trail construction, approved skid trail or road crossings, or agreed to by a riparian specialist (W2).

- Consult with the Forest Service aquatic biologist or Forest Service hydrologist prior to using existing landings or constructing new landings or roads within RCAs (W12).

- Consult with the Forest Service hydrologist or Forest Service aquatic biologist prior to constructing temporary roads across ephemeral or intermittent drainages (W13).

Table 8, below, shows acreage of proposed treatments to be implemented within SNYLF suitable habitat under the proposed action.

Table 8. Acreage of Treatments Proposed Within SNYLF Suitable Habitat[1] (Proposed Action).

Treatment Type	SNYLF Suitable Habitat			Total Acreage
	Stream (Perennial)	Stream (Intermittent)	Wetland/ Meadow	
Mechanical Thin				
Mechanical Thin/ Mechanical Fuels Treatment	55.76	28.59	0.94	**85.29**
Mechanical Thin/ Prescribed Fire	0.10	19.57	0	**19.67**
Mechanical Thin (Plantations and Small Trees)				
Mechanical Thin Natural Stands (Small Trees)/ Mechanical Fuels Treatment	126.10	36.17	0.25	**162.52**
Mechanical Thin Natural Stands (Small Trees)/ Prescribed Fire	0	1.16	0	**1.16**
Mechanical Thin Plantation	2.65	0.83	0	**3.49**
Mastication (Plantations and Natural Stands)				
Mastication Thin Natural Stands	7.30	22.33	1.75	**31.38**
Mastication Thin Natural Stands/ Prescribed Fire	4.07	0	0	**4.07**
Mastication Thin Plantation	12.47	10.77	0.51	**23.75**
Release Mastication (Plantation)	0.00	5.01	0	**5.01**
Release Mastication (Plantation)/ Prescribed Fire	2.33	9.09	0.00	**11.42**
Hand Thin	30.68	6.38	0	**37.06**
Reforestation - Site Prep and Plant	0.96	3.74	0.00	**4.70**
Prescribed Fire	126.64	194.07	0	**320.72**
Total	**369.06**	**337.72**	**3.45**	**710.24**

[1]SNYLF suitable habitat is defined to include perennial and intermittent streams, wetlands, and meadow habitats, plus a 25-meter (82-foot) upland buffer.

A summary of mechanical thinning and mastication to be implementated within SNYLF suitable habitat is provided as Table 9, below. Mechanical thiining and mastication are proposed within approximately 210.78 acres of SNYLF perennial stream habitat (approximately 25 percent of total perennial stream habitat); 133.52 acres of intermittent stream habitat (23 percent); and 3.45 of SNYLF wetland/meadow habitat (3.4 percent). As required by W2, no ground-based equipment would be used during removal of

trees within riparian buffers containing SNYLF habitat unless required for meadow, aspen, and cottonwood restoration, trail construction, approved skid trail or road crossings, or agreed to by a riparian specialist. Instead, trees would be thinned by hand, or using a feller buncher staged outside the riparian buffer. A feller buncher consists of a tracked or wheeled heavy equipment base with an articulated arm furnished with a cutting/acumulating head designed to cut trees up to 24 inches in diameter and to collect and carry the cut trees. Use of the feller buncher would allow for removal of smaller trees (generally less than 24 inches DBH) within about 20 feet of the outside edge of the designated riparian buffer.

Table 9. Summary of Mechanical Thinning and Mastication Within SNYLF Suitable Habitat.

Treatment Type	Stream (Perennial)	Stream (Intermittent)	Wetland/ Meadow	Total Acreage
Mechanical Thin/ Mechanical Fuels Treatment	55.76	28.59	0.94	**85.29**
Mechanical Thin/ Prescribed Fire	0.1	19.57	0	**19.67**
Mechanical Thin Natural Stands (Small Trees)/ Mechanical Fuels Treatment	126.1	36.17	0.25	**162.52**
Mechanical Thin Natural Stands (Small Trees)/ Prescribed Fire	0	1.16	0	**1.16**
Mechanical Thin Plantation	2.65	0.83	0	**3.49**
Mastication Thin Natural Stands	7.3	22.33	1.75	**31.38**
Mastication Thin Natural Stands/ Prescribed Fire	4.07	0	0	**4.07**
Mastication Thin Plantation	12.47	10.77	0.51	**23.75**
Release Mastication (Plantation)	0	5.01	0	**5.01**
Release Mastication (Plantation)/ Prescribed Fire	2.33	9.09	0	**11.42**
Total	**210.78**	**133.52**	**3.45**	**347.76**

Table 10, below, provides a summary of the extent of road closures, decommissioning, reconditioning/ maintenance activities and trail construction to be implemented within suitable habitat for SNYLF. In general, impacts to SNYLF suitable habitat from these activities would be negligible. These activities would occur within a total of 4.12 acres or 0.003 percent of the total acreage of SNYLF suitable habitat. Acreage of road ant trail work was calculated assuming a 20-foot work area along the roads and trail alignments.

Table 10. Miles and Acreage of Road Closure, Decommissioning, Reconstruction/ Maintenance Activities and Trail Construction within SNYLF Suitable Habitat.

	Mile/Acres of Road Work Required within SNYLF Suitable Habitat	
Road Work Type	**Miles**	**Acres**
Road Closure	0.11	0.26
Road Decommissioning	0.70	1.69
Road Reconstruction/Maintenance	0.63	1.52
Temporary Spur Road Construction	0	0
Trail Construction	0.54	1.31
Total	**1.98**	**4.78**

Closure of 0.11 mile of road would involve installation of gates to prevent public wheeled motor vehicle travel for resource protection; and decommissioning of 0.7 mile of road would involve blocking roads with logs, rocks, or barricades. Tilling and spreading seed and/or slash, and water barring (i.e., if the road

requires erosion control) may also be implemented on an as-needed basis. In cases where the roads are already impassible due to encroaching vegetation, no further action would be necessary. All decommissioned roads would be removed from the Forest Service system, which is an administrative function. Road closure and decommissioning is not expected to affect SNYLF and may benefit SNYLF by reducing motor vehicle presence in suitable habitat.

Road reconditioning/maintenance would occur along approximately 0.63 mile of roads within suitable habitat for SNYLF. This work would also have negligible effects, considering that it would be conducted primarily within the prism of existing roads and work would be limited to approximately 1.52 acre of habitat, or 0.001 percent of total acreage of SNYLF suitable habitat. No construction of temporary spur roads will be required within SNYLF habitat.

Construction of 0.54 mile of new non-motorized trail on the south-souteast side of French Meadows reservoir will take place within approximately 1.31 acres of suitable habitat, approximately 0.0008 percent of total suitable habitat. Construction will require use of mechanized equipment and could therefore affect SNYLF. However, this work is expected to have a minimal effect in that it would be conducted in a relatively developed area located between the reservoir and French Meadows Road (Forest Road 96) and is limited to 0.0008 percent of suitable habitat.

Any risk of direct impacts to SNYLF would be further minimized by AW1, which states that if a sensitive or listed amphibian or reptile is sighted within the project area, a Forest Service aquatic biologist would be informed of the sighting immediately. If determined necessary, avoidance and protection measures would be developed and implemented based on the nature of work required and site-specific conditions. Considering that SNYLF are not known to occur in the project area and are unlikely to be present in upland areas where ground-based equipment would be used and trees felled, and with implementation of management requirements, the risk of direct impacts to SNYLF individuals is negligible.

Prescribed Fire: The proposed action includes prescribed fire on 6,186 acres within the project area, either as a stand-alone treatment or as a follow-up treatment after completion of mechanical thinning or mastication (Table 8). As shown in Table 11, below, this includes approximately 357.04 acres of prescribed fire proposed within suitable perennial stream, intermittent stream, and wetland/meadow habitat for SNYLF (approximately 24 percent of suitable habitat). Prescribed fires are designed to be short-lived and low-intensity. SNYLF are not expected to be directly harmed by prescribed fire treatments for several reasons.

Table 11. Summary of Prescribed Fire Treatments within SNYLF Suitable Habitat.

Treatment Type	Stream (Perennial)	Stream (Intermittent)	Wetland/ Meadow	Total Acreage
Mechanical Thin/ Prescribed Fire	0.1	19.57	0	**19.67**
Mechanical Thin Natural Stands (Small Trees)/ Prescribed Fire	0	1.16	0	**1.16**
Mastication Thin Natural Stands/ Prescribed Fire	4.07	0	0	**4.07**
Release Mastication (Plantation)/ Prescribed Fire	2.33	9.09	0	**11.42**
Prescribed Fire	126.64	194.07	0	**320.72**
Total	**133.14**	**223.89**	**0**	**357.04**

Research indicates that prescribed fire is likely to have no or minor direct effects on amphibians. While amphibian responses to fire are spatially and temporally variable and not completely understood (Pilliod et al. 2003), the immediate effects of wildfire (mortality of individuals, failed reproduction) are expected

to pose a small threat to most healthy populations, unless stressors such as drought or persistent habitat change have left populations isolated or with an extremely limited distribution (Hossack and Pilliod 2011). Greenberg and Waldrop (2008) studied the short-term response of reptiles and amphibians to prescribed fire and mechanical fuel reduction in a southern Appalachian upland hardwood forest. They found that the relative abundance of amphibians was not changed by the fuel reduction treatments. An Australian study of the effects of low-intensity fire on six burnt and six unburnt pond habitats found no significant associations between the number of frogs and fire activity (Lemckert et al. 2004).

Management requirements built into the proposed action would further minimize any potential for impacts to SNYLF from prescribed fire. As described previously, riparian buffers would be established along perennial streams or intermittent streams, special aquatic features, and ephemeral streams representing suitable habitat for SNYLF (W2). Management requirement W4 states that no direct ignition will be conducted within riparian buffers; however, unless otherwise agreed by the Forest Service riparian specialist, hydrologist, botanist, or aquatic biologist. Fire may back in to riparian buffers. No pile burning will be conducted within the riparian buffer. Burning prescriptions should be developed to retain effective soil cover, coarse woody debris, and standing snags throughout the RCA; however short-term reductions may occur. Further, no pile burning would be conducted within the riparian buffer. Fire lines would be constructed prior to ignition of prescribed burns. Consistent with management requirement W2, hand methods would be used when removing trees or shrubs to create fire lines within riparian buffers. Duff and other organic matter that could ignite would also be removed. Perennial streams may also serve as fire lines, where practicable.

Given that SNYLF are extremely aquatic and rarely found out of water, and with implementation of management requirements W2 and W4, any potential for direct impacts to SNYLF from prescribed burning (including construction of fire lines) or pile burning would be minimal.

Erosion Control Materials: Wildlife, including birds, small mammals, snakes, and amphibians, may potentially become entangled or entrapped in plastic or synthetic mesh erosion control or animal exclusion materials used for construction and forestry projects. In order to avoid SNYLF mortalities resulting from entrapment or entanglement, AW2 prohibits the use of tightly woven fiber netting or similar material for erosion control or other purposes within suitable habitat to ensure that special-status amphibians do not get trapped, injured or killed. Implementation of AW2 would minimize the potential for direct impacts to SNYLF from erosion control materials.

Chemical Use: The use of borate compound (otherwise known as borax) is proposed for cut stumps of live conifers greater than 3 inches diameter within recreation areas, and greater than 14 inches in all other areas. In addition, dust palliatives (e.g., lignin sulfonate or magnesium chloride) may be used to abate dust on native and aggregate surface roads. Use of these chemicals could potentially affect freshwater aquatic species, including SNYLF, if the chemicals were to be introduced into aquatic habitats directly or from storm water runoff.

Although no research has been conducted to assess the effects of borax on SNYLF, a study using larval leopard frogs (*Rana pipiens*) found borax toxicity is relatively low (SERA, 2006). Studies of borax toxicity upon other aquatic organisms deemed borax to be "practically non-toxic" (Information Ventures, Inc., 2003). Although borax toxicity is considered to be low, management requirements would still be in place to prevent borax from entering watercourses and potentially affecting aquatic habitats. Management requirement W5 states that no borax would be applied within 25 feet of surface water. Application of borax will also cease if rain is falling or determined likely, to avoid misapplication and runoff.

Lignin sulfonate is a wood by-product that is soluble in water. Lignin sulfonates may affect water quality and aquatic wildlife by increasing water acidity/decreasing pH and decreasing dissolved oxygen available for respiration (USDA 2011). However, such effects have only been observed at high application rates. Magnesium chloride is a salt which is considered to have minimal impacts to water quality (Goodrich et al 2009, Shi et al. 2009) and is non-toxic to sensitive aquatic life (Edvardsson 2010). In order to prevent effects to aquatic species, management requirement W11 requires a 100-foot buffer for perennial streams and a 50-foot buffer for intermittent streams when using dust palliatives.

With implementation of management requirements, the application of borate compound to live cut stumps and use of dust palliatives to protect air quality within the project area would have a negligible risk of affecting SNYLF.

Water Drafting and Water Balance Research: Water drafting during implementation of the project and installation of in-stream equipment associated with water balance research following completion of the project could potentially impact SNYLF. The primary risk with water drafting comes from egg masses and/or tadpoles coming into contact with equipment used to suction water from the stream/watering source. Although screens are placed on the ends of water intake hoses to aid in preventing suction of aquatic species, egg masses and tadpoles may be smaller than the mesh size present on the screens.

Several management requirements would minimize the potential for egg masses or tadpoles to be affected by water drafting operations. Management requirement AW3 limits water drafting, to the extent possible, to French Meadows Reservoir. Use of non-reservoir locations would require consultation with the Forest Service biologist to obtain approval and to determine whether the location represents suitable habitat for SNYLF. If required, surveys for SNYLF would be conducted prior to use, and avoidance and protection measures developed in consultation with agencies considering site-specific conditions. In addition, AW4 requires use of drafting devices with 2-mm or less screening and placement of hose intakes into a bucket in the deepest part of the pool. Low velocity water pumps must be used; and ponds must not be pumped to low levels beyond which they cannot recover quickly (i.e., within approximately 1 hour). With implementation of management requirements, any potential for impacts to SNYLF egg masses or tadpoles during water drafting would be minimal.

UC Merced is designing a research project to quantitatively evaluate forest management impacts on hydrology. To facilitate this research the Forest Service is proposing to authorize installation (and related site access) of instream pressure transducers, soil moisture sensors down to a maximum depth of 1 meter, snow depth sensors, dendrometers, and sapflux sensors in five sub-basins to collect accurate spatial measurements of the inputs and outputs of the local water balance within the Rice Creek (1, 2 and 3), Dolly Creek, Grayhorse Creek and Chipmunk Creek sub-basins. Rice 1, Rice 2, Rice 3, and Dolly Creek sub-basins have been instrumented with instream pressure transducers (installed on a rebar rod and anchored to bedrock) for stream stage measurements since 2013. An instrument cluster with ten nodes of snow depth, soil moisture, temperature, and relative humidity sensors has operated since 2015. Under the proposed action, two additional instrument clusters would be installed within Chipmunk Creek and Grayhorse Creek along with dendrometers and sapflux sensors. A photograph of a typical pressure transducer level logger configuration is provided as Figure 5. Installation would occur during low- or no-water conditions and would be limited to a small area (approximately 1 square foot). Given the extremely minimal extent of equipment required, potential direct effects are negligible. In addition, the two instrument clusters will use recent advances in wireless technologies to move data to a base station, minimizing the potential impact associated with site access. Installation of two additional instrument clusters would not directly affect individual SNYLF.

Figure 5. Typical Pressure Transducer Level Logger Configuration to be used for UC Merced's Water Balance Research.

Summary of Direct Effects

The proposed action is not expected to result in direct impacts to SNYLF. While the project includes 1502.5 acres of suitable habitat, this habitat contains unknown utilization. In the unlikely event that individual SNYLF are present in the project area, management requirements incorporated into the project would minimize the potential for impacts resulting from direct contact with ground-based equipment or felled trees; contamination from use of borax or dust palliatives; and impacts to SNYLF egg masses or tadpoles during water drafting. In addition, impacts from installation of two additional instrument clusters for implementation of water balance research would have a negligible direct effect on SNYLF.

Indirect Effects

Potential indirect effects to suitable habitat for SNYLF or other effects that would occur later in time include 1) sedimentation within aquatic habitats resulting from ground disturbance, vegetation removal and subsequent exposing of soils, 2) changes in hydrology within suitable habitat, and 3) a reduction in canopy cover resulting in increased ambient or water temperatures.

Sedimentation: The Proposed project could potentially affect aquatic habitats through increased erosion and sedimentation. Ground-disturbing activities related to vegetation treatments could potentially affect approximately 347.04 out of the 1502.5 acres or approximately 23 percent of suitable perennial, intermittent, and wetland/meadow habitat for SNYLF (refer to Table 8). Road activities would occur within a total of 3.47 acres or 0.002 percent of the total acreage of SNYLF suitable habitat (Table 9). The Proposed project does not include construction of any permanent new roads, and any ground-disturbing effects from road maintenance/reconditioning or construction of temporary spur roads would be short-term and temporary, and minimized through implementation of the management requirements described below. However, in the longer term, proposed vegetation management activities, including mechanical thinning, hand thinning, and prescribed fire, could potentially expose bare soil and destabilize hill slopes. Exposed, unprotected soil has the potential to move into aquatic systems, particularly with the season's first significant rain or during overland flows following snowmelt. Increased sedimentation within aquatic habitats could in turn affect SNYLF. Sedimentation can affect all life stages of amphibians by altering habitat (see Brown et al. 2009, Brown et al. 2014a). High levels of sediment can fill deep pools used by SNYLF, alter primary productivity, fill interstitial spaces in stream and lake bed materials with fine particulates, change flow characteristics, reduce dissolved oxygen, and restrict waste removal (Chapman 1988). Embedded substrate potentially reduces the amount and quality of refugia. Fine sediment can also potentially smother SNYLF egg masses, and increased water turbidity could restrict respiration for tadpoles in off-channel habitat. However, there is a low risk of increased sedimentation within suitable aquatic habitats for several reasons.

Overall, the project is designed to thin forest stands and reduce fuel loads consistent with Forest Plan RCOs and standards for old growth species, ensuring sufficient retention of vegetation to maintain soil stability. Forest Plan standards and guidelines establish minimum canopy cover and basal area thresholds for thinning outside of Wildland Urban Interface (WUI) defense zones. To meet the Forest Plan standards while minimizing the need for subsequent re-entry and re-treatment of stands, the lower end of basal area retention outside of California spotted owl home range core areas (HRCA) in the proposed action has been changed from 140 to 120 square feet, and basal area retention of 100 to 140 in the WUI defense zones was added. However, stand treatments under the proposed action would still be prescribed to conform to the Forest Plan, address site-specific stand conditions, address concepts in General Technical Reports 220 and 237, increase heterogeneity to improve forest health to the greatest extent feasible, while contributing to longevity of treatments. Trees would be removed selectively consistent with the principles described by North et al. (2009, 2012), and thinning prescriptions would be designed to promote heterogeneous stands comprised of small openings (generally ¼ to 1 acre in size), dense patches and clusters of medium to large size trees, and lower density areas. Trees with characteristics useful for wildlife such as cavities or multiple tops would be retained. Prescribed fires, which would be implemented within approximately 357 acres of suitable habitat for SNYLF (representing 24 percent of total habitat) (Table 8), are expected to be short-lived and fire intensity would be low enough to allow some retention of duff layers and vegetation that would prevent soil erosion.

Project-specific management requirements for soils and terrestrial wildlife incorporated into the proposed action would further minimize the potential for erosion and sedimentation resulting from ground-

disturbing activities associated with forest treatments and road maintenance, reconditioning or construction throughout the project area. These include, but are not limited to:

- Requirements to operate of mechanical equipment only when soil moisture is less than 20 percent by weight and cease work when required by rain, high water, or other adverse operating conditions (S1);
- Restriction of ground-based mechanical equipment and other restrictions on slopes generally less than 30 percent (S2);
- Maintenance of effective soil cover (post-project condition) consistent with the Forest Plan (S3);
- Retain large downed woody debris at appropriate rates (TW10, and TW12) and avoid direct ignition of large downed woody debris (TW11);
- Limit tractor piling to slopes less than 20 percent and compliance with RCOs for machine piling (S7).
- Retain riparian vegetation and hardwoods (except where removal is needed for operability or safety or as designated for meadow, aspen, and cottonwood restoration) (TW7);
- Retain stands of berry producing or less common native shrub species; and retain common shrub species where feasible (TW8); and
- Retain large snags consistent with Forest Plan direction (TW9).

In addition, the proposed action includes specific measures that limit vegetation removal and prevent erosion and sedimentation within RCAs delineated along aquatic features representing suitable habitat for SNYLF. These include:

- Establishing riparian buffers and prohibiting use of ground-based equipment within the buffers unless required for meadow, aspen, and cottonwood restoration, trail construction, approved skid trail or road crossings, or agreed to by a riparian specialist (W2);
- Designing fire plans to retain effective soil cover, coarse woody debris, and standing snags throughout the RCA; however short-term reductions may occur (W3);
- No direct ignition or pile burning within riparian buffers unless agreed to by a Forest Service riparian specialist, hydrologist, botanist, or aquatic biologist. (W4);
- Consulting with the Forest Service prior to using existing landings or constructing new landings or roads within RCAs (W12) or constructing temporary roads across ephemeral or intermittent drainages (W13).

As described previously, ground-disturbing vegetation treatments, road maintenance/reconditioning, and prescribed fire could potentially impact suitable habitat for SNYLF. However, implementation of the management requirements listed above would substantially reduce the extent of these potential impacts. For example, with implementation of management requirement W2, the total acreage of suitable habitat for SNYLF affected by ground-disturbing vegetation treatments would be reduced from approximately 668 acres (44 percent of total SNYLF suitable habitat) to 124 acres (8 percent of total suitable SNYLF habitat). Ground disturbance from road work would be extremely minor and would affect only 3.47 acres (0.002 percent) within SNYLF suitable habitat. Prescribed fire would be conducted in 357 acres of suitable habitat for SNYLF (representing 24 percent of total habitat), but no direct ignition or pile burning would occur within this acreage. Because the project is designed to retain vegetation consistent the Forest

Plan; and with inclusion of management requirements for retention of vegetation and soil stabilization throughout the project area and within RCAs, the risk of indirect effects to SNYLF and their habitat from sedimentation would be considered low.

Hydrology: Changes in vegetation structure in a watershed have the potential to change the portion of precipitation that ends up as runoff to creeks and streams. In general, reducing vegetative cover increases water yield, and increasing vegetative cover decreases water yield (Hibbert 1967). The greatest change in annual streamflow following reductions in vegetative cover occurs in conifer forests, while the least response occurs following modification of scrub land cover (Troendle et al. 2007). The magnitude and duration of changes in a forest's water balance also depend on subsurface water storage, climate variability, vegetation patterns, and subsequent disturbance or management actions.

The project area supports a total of 41.13 miles of perennial streams, 28.61 miles of intermittent streams, and 101.74 acres of meadow, wetland, or pond habitat representing suitable habitat for SNYLF. Suitable habitat for SNYLF would be negatively impacted if the proposed action resulted in a reduction in the amount or duration of streamflow or in a reduction in the depth of ponds. However, because the project would thin vegetation to reduce fuel loads, the proposed action is expected to increase rather than decrease runoff within stream habitats, and connected pond habitats would be maintained or increased in depth. The magnitude and duration of such increases is unknown and is dependent on a number of factors[2]. Troendle et al. (2007) note that, "In the case of fuels management activity, hydrologic impact is relatively small because only a portion of the forest canopy is usually removed. (And) at least 20 percent of the basal area in a forested watershed above the point of streamflow measurement must be removed to reliability generate a measurable change in yield." Therefore, impacts to suitable habitat resulting from changes in hydrology are expected to be negligible.

Water drafting could also affect hydrology within suitable habitat for SNYLF. As described previously, the proposed action includes several management requirements to limit the amount of water removed from streams or ponds during drafting. AW3 limits water drafting, to the extent possible, to French Meadows Reservoir, which does not represent suitable habitat for SNYLF. Consultation with the Forest Service aquatic biologist and, if determined necessary, implementation of surveys and avoidance and protection measures would be required prior to drafting of water from other sources. In addition, AW4 requires use of low velocity water pumps and states that ponds must not be pumped to low levels beyond which they cannot recover quickly (i.e., within approximately 1 hour). AW5 sets limits for water drafting rates within fish-bearing and non fish-bearing streams. These management requirements would protect water levels within suitable habitat during implementation of the proposed action. Therefore, impacts would be considered negligible.

Canopy cover and water temperature: Reductions in stream channel canopy cover can potentially lead to increased water temperatures, particularly in the mid- to late-summer months when temperatures are high and water levels begin to recede as snowmelt declines. The relationships between canopy cover surrounding aquatic habitats and microclimatic requirements of SNYLF are not known. Amphibians in

[2]As described in Section V and Appendix B (Proposed Action and Alternatives), the Proposed Action includes research to quantitatively evaluate forest management impacts on hydrology (e.g., snow accumulation and melt, soil moisture, streamflow, and and evapotranspiration) and forest health (e.g., tree height, growth, mortality, and leaf area index) and apply results from this Project to other Sierra Nevada watersheds through modeling.

general, including SNYLF, require warm water and basking sites. Consistent with this, USFWS states that, in upland habitat for SNYLF "in areas that contain riparian habitat and upland vegetation (for example, mixed conifer, ponderosa pine, montane conifer, and montane riparian woodlands), the canopy overstory should be sufficiently thin (generally not to exceed 85 percent) to allow sunlight to reach the aquatic habitat and thereby provide basking areas for the species." (USFWS 2016). Reduction of canopy cover may therefore benefit the species by increasing the amount of available warm water and basking sites. Too great of a reduction in canopy, however, may impact the species if temperatures increase higher than thermal tolerances. Further, the importance of canopy cover may vary among the different habitats (e.g., streams, lakes, meadows, terrestrial habitats).

The effects of the proposed action on canopy cover and water temperature would be minimal for several reasons. Reductions in canopy cover along 28.61 miles of intermittent stream channels would have minimal effect on water temperature for several reasons. First, these channels are usually devoid of water by mid-summer. Second, the Forest Ecosystem Management Assessment Team (FEMAT 1993) describes trees within 100 feet of stream channels as being more influential in providing canopy cover than trees outside that range. As described previously, management requirements W2 and W4 would establish riparian buffers along streams and would prohibit use of ground-based equipment and ignition of fires within these buffers. As a result, removal of trees would be limited to removal of small trees by hand, or removal of trees within the outer limits (approximately 20 feet) of the riparian buffer using a feller buncher. With implementation of management requirements, the effect of these limited forest treatments on canopy cover within 100 feet of perennial aquatic habitats would be minimal and could benefit SNYLF through an increase in availability of warm water and basking areas.

Summary of Indirect Effects

Overall, the project is expected to have minimal indirect effects on SNYLF or its habitat resulting from erosion and sedimentation or changes in hydrology, canopy cover, or water temperature. Vegetation treatments involving ground-based equipment could affect 347.76 acre (or 23 percent) of suitable habitat; however, with implementation of management prescription W2 ground-based equipment would be excluded from all but approximately 59 acres, or 3 percent of total habitat. Prescribed fire could affect 357.04 acres (or 24 percent) of suitable habitat; however, with implementation of management requirement W4, direct ignition and burning of piles would be prohibited within this acreage. Finally road and trail work could affect 3.47 acre, representing only 0.002 percent of suitable habitat. With implementation of management requirements for retention of vegetation and soil stabilization, the risk of indirect effects to SNYLF and their habitat from sedimentation would be considered low. Suitable habitat for SNYLF would be negatively impacted if the proposed action resulted in a reduction in the amount or duration of streamflow or in a reduction in the depth of ponds. However, because the project would thin vegetation to reduce fuel loads, the proposed action is expected to increase rather than decrease runoff within stream habitats, and connected pond habitats would be maintained or increased in depth. Water drafting could also affect hydrology within suitable habitat for SNYLF, but would be limited, to the extent possible, to French Meadows Reservoir. Water drafting from other locations would require consultation with the Forest Service aquatic biologist and would be subject to the limitations of management requirements. Considering incorporation of management requirements W2 and W4, summarized above, forest treatments within 100 feet of perennial stream habitat for SNYLF would result in only minor changes in canopy cover, which could benefit SNYLF through an increase in availability of warm water and basking areas.

Cumulative Effects

SNYLF Critical Habitat

There is no USFWS designated critical habitat in the project area or in area of analysis for cumulative effects. Therefore there are no cumulative effects within USFWS designated critical habitat for SNYLF.

SNYLF and Suitable Habitat

Appendix D provides a list of past, present, and reasonably foreseeable future actions in the project area. This includes vegetation management; forest and meadow restoration projects; grazing; recreational use and recreational facility construction and maintenance; and the continued operation and maintenance of PCWA's MFP. Each of these is briefly described below.

Vegetation Management and Restoration: Past forest management practices in the cumulative effect analysis area have resulted in overly dense stands of trees, with a large component of small shade tolerant white fir. Trees growing closely together compete for soil nutrients and water, resulting in slower growth and higher risk of becoming weakened and susceptible to insect infestation, pathogens, and drought-induced tree mortality. In addition, dense stands of small trees are vulnerable to high-severity wildfire. Several large, stand replacing wildland fires have occurred in or adjacent to the project area in recent years, including the Star Fire (17,000 acres; 2001), Ralston Fire (8,422 acres; 2006), American River Complex Fire (20,541 acres; 2008), American Fire (27,440 acres; 2013), and the King Fire (97,700 acres; 2014). TNF implements fire management, including treatment of hazardous fuels, and responds to wildfires on Forest Service lands.

Past and ongoing vegetation management and restoration projects in the cumulative effects analysis area include:

- The American River Headwaters Project, a 10,115-acre watershed restoration and research project on an expense of land along the Sierra crest. This effort involves forest thinning and fuels reduction, meadow restoration, and road and culvert maintenance as well as road decommissioning and conversion of roads to trails.
- The Biggie Project, which includes forest thinning, fuels reduction, and hazard tree removal within a 2,620-acre area.
- The French Meadows Riparian and Meadow Restoration Project, a 148-acre project to restore meadows and increase the vigor and spatial extent of aspen and cottonwood stands.

Similar to the proposed action, the overall purpose of the above-listed vegetation management and restoration projects is to thin forests, reduce fuel loads, and restore forest or meadow habitats. Such activities have some potential to affect SNYLF, primarily through alteration of vegetation within riparian habitat, increases erosion and sedimentation resulting from use of ground-based equipment, or through changes in hydrology. However, with implementation Forest Plan management requirements that limit vegetation removal, use of ground-based equipment, and direct ignition of prescribed fire within riparian buffers, such effects would be minimized and pose a low risk of direct effects to SNYLF or indirect effects to suitable habitat. Cumulatively, these actions are intended to improve forest health, restore meadows, and/or reduce the risk of catastrophic fire which represents a benefit to SNYLF and their habitat.

Livestock Grazing: Livestock grazing has been ongoing in the cumulative effects analysis area since the mid-19th century. TNF has recently authorized issuance of grazing permits for the continued use of the following grazing allotments within the analysis area:

- The Chipmunk Grazing Allotment, which comprises 44,303 acres on Forest Service lands; and
- The Mosquito Grazing Allotment, which comprises 26,105 acres on Forest Service lands.

The grazing effects that would contribute to cumulative effects to SNYLF or their habitat include grazing on plant leaves and reproductive structures, trampling, browsing on riparian vegetation, addition of fecal material into streams, and stream bank disturbance and erosion. Approvals for grazing permits include adaptive management strategies to ensure grazing activities are implemented consistent with the Forest Plan and meet resource objectives, limiting the indirect effects of grazing in the cumulative effects analysis area. The adapative management process includes monitoring of riparian habitat sites . If it is determined that conditions are not in, or moving towards, desired condition, as indicated by SNFPA ROD standards, then salting locations are reviewed and location changes made to ease grazing pressures and help disperse utilization away from riparian habitats and reduce sedimentation. If utilization remains high then short-term electric fences or barrier fences are put in place and maintained by the Forest to exclude use from sites impacted by hoof-punching, trampling, and extensive trailing. If after that time, fences are removed and sites are again impacted, more stringent methods would at that time be analyzed to keep livestock from further impacting the sites. Additional riparian habitat sites identified in projects within the allotment boundary are also monitored in the same manner. If needed, analysis would be conducted to protect these sites when determined that there is livestock impact.

Recreation: There are numerous existing developed campgrounds, dispersed recreation areas, hiking trails, and other recreational features in the cumulative effects analysis area. These features are located primarily on Forest Service lands; however, dispersed recreation also occurs on private lands in the area of analysis. The TNF's outdoor recreation program is designed to protect, administer, and develop outdoor recreational opportunities consistent with resource values. Current recreation use includes dispersed and developed camping, off-highway vehicle (OHV) use (four-wheel drive and motorcycle), hiking, and fishing.

The following projects which include construction of new recreation facilities or modification of existing recreation facilities have occurred or will occur within the analysis area:

- Development or rehabilitation of hiking trails will occur as part of the American River Headwaters Project.
- The Big Sugar Project is a future effort that proposes new trails and trail reroutes/decommissions in the vicinity of French Meadows Reservoir.
- TNF recreational facilities in the vicinity of French Meadows Reservoir, including campsites, hiking trails, boat launches, and parking areas, will also be rehabilitated or constructed as part of the new license for the MFP (see Hydroelectric Operations and Maintenance, below).

In general, construction or modification of recreation facilities under the above-listed projects is intended to address projected increases in recreational use as well as changing trends in use, e.g., through construction of additional hiking trails (including the two trails to be constructed under the proposed action) and conversion of single-family campsites to group campsites. Construction activities within riparian areas could result in short-term impacts to suitable habitat for SNYLF, primarily through use of ground-based machinery and removal of vegetation; and new facilities in or near riparian areas could

result in limited but permanent conversion of natural habitat. Environmental analyses for the American River Headwaters Project and Big Sugar Project are still in development; however, both projects will be implemented consistent with Forest Plan management requirements, including RCOs. The new license for the MFP will include construction best management practices to minimize impacts to riparian habitat and water quality during recreation facility construction. These include, but are not limited to, conducting construction during minimal runoff periods, implementing erosion control techniques, locating fueling sites away from water features, and prohibiting removal of riparian vegetation. In addition, PCWA will obtain permits and agency approvals required for for within waters of the U.S./State on a project-specific basis. All conditions contained in the permits or approvals would be implemented as part of each project ((PCWA 2011; FERC 2012; FERC 2013).

As stated previously, recreational use in the area of analysis for cumulative resources is expected to increase in the foreseeable future. Ongoing and increased recreational use could affect SNYLF habitat. For example, OHV use on private property occurring across wetlands and streams causes substantial negative impacts, including: stream bank disturbance or collapse, soil compaction and erosion, crushing or uprooting of plants, loss of plant cover, and an increase in bare ground. In popular campsites, impacts from concentrated use include: increased risk of wildfire, soil compaction and erosion, loss of plant cover and increase in bare ground and runoff —usually occurring on the same sites on a yearly basis. Because many popular campsites are also associated with water, usually within the riparian zone, this use would also affect water quality, directly through introduction of detergents and food preparation wastes, and indirectly through increased sedimentation from effects of soil compaction and erosion. Construction and rehabilitation activities associated with the above-listed projects are expected to reduce impacts within riparian areas by limiting dispersed use, focusing recreation within designated facilities, and reducing public access to natural areas.

Hydroelectric Operations and Maintenance: French Meadows Reservoir is a water storage and hydro-generation facility that is part of PCWA's MFP, designed to manage streamflows in the Middle Fork American River, the Rubicon River, and several associated tributary streams. The existing license expired February 28, 2013 and PCWA is seeking renewal of its license to continue operation and maintenance of the MFP. Pursuant to authorization from FERC on March 7, 2013, PCWA is currently operating the MFP under an annual license, under the terms and conditions of the prior license. The new license is expected to be issued in January 2019. Due to the recent listing of SNYLF, FERC is currently conducting supplemental Section 7 consultation with USFWS to determine whether operations and maintenance of the project under the new license would affect SNYLF. A supplemental BA analyzing the potential effects of the MFP was submitted to USFWS on June 8, 2016. The BA describes potential effects to suitable habitat above 4,500 feet in project-affected reaches resulting from continued stocking of project reservoirs, continued operation of the project (reduced flows and flow fluctuations in river reaches and changes in reservoir levels); routine vegetation and pest management maintenance activities including trimming of vegetation and use of herbicides, surfactants, and fungicides; potential for erosion and sedimentation associated with maintenance of project roads and trails and recreational facilities; turbidity and sedimentation from sediment management activities, and ground disturbance and vegetation removal associated with new recreation and project facility construction, modifications, or improvements. Specific environmental measures that will be implemented as part of the new FERC license could benefit habitat for SNYLF including (but not limited to) implementation of MFP resource management plans; implementation of construction and water quality best management practices; increased instream flows in bypassed reaches, and pulse flows and down-ramped reservoir flows that would improve aquatic habitats; reduce water temperatures, enhance riparian habitat, and reduce erosion and sedimentation. In addition Forest Service section 4(e) conditions including (but not limited to) preparation of a BE prior to construction of any new project features on Forest Service land that may affect SNYLF; and restrictions

on the use of herbicides without the prior approval of the Forest Service. USFWS has since provided recommendations for addition or revised measures to minimize and avoid effects to SNYLF. PCWA is currently working with FERC and USFWS to finalize these measures for issuance of a BO with the conclusion that the MFP will have no effect on SNYLF or its habitat. There is no designated Critical Habitat for SNYLF within MFP project boundaries. Therefore, the ongoing operation and maintenance of the MFP will not affect designated Critical Habitat.

Cumulative Effects Summary for the Proposed Action (Alternative 1)

Implementation of site-specific and project-wide management requirements associated with the proposed action would result in a negligible risk for effects to SNYLF individuals or suitable habitat located within and downstream of the project area. When combined with effects resulting from ongoing and reasonably foreseeable actions on non-federal lands within the area of analysis the project would have a negligible risk for additional, incremental to SNYLF or their habitat.

No Action (Alternative 2)

Provided below is a discussion of direct, indirect and cumulative effects to SNYLF and their habitat under the No Action alternative (Alternative 2). There is no USFWS designated critical habitat in the project area or in area of analysis for cumulative effects. Therefore, there are no direct, indirect, or cumulative effects to USFWS designated critical habitat for SNYLF.

Direct and Indirect Effects

Under the No Action alternative, trees and understory vegetation would not be thinned and project-related disturbance to individuals would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Dynamic conditions, processes, and functions of aquatic habitats in the analysis area generally would persist. However, because vegetation thinning and reduction in fuel loads would not occur under the No Action, the longer-term potential for high-intensity, catastrophic fire would remain. While lower-intensity fire (including prescribed burning) is not considered likely to adversely affect SNYLF, one recent study modeling wildfire impacts on forest habitats in the Sierra Nevada indicates that, without changes in management strategies, catastrophic fire will result in severe reductions in forest cover within the Sierra Nevada within the next 75 years (Stephens et al. 2016). Fire and fuels modeling output for the French Meadows Project indicate increased fire behaviors under all parameters under the No Action as compared to the proposed action or Alternative 3. This includes increased crown fire activity, crown fraction burned flame length, rate of spread, burn probability, flame length probability. High-intensity fires could result in extensive removal of riparian and upland forest vegetation and subsequent exposure of soils. Destabilization of soils could, in turn, impact suitable habitat for SNYLF through increased sedimentation. The No Action alternative could, therefore, adversely affect SNYLF.

Cumulative Effects

The No Action alternative could result in cumulative effects to suitable habitat for the SNYLF. Past actions have had slightly beneficial to slightly detrimental effects to non-breeding habitat in the analysis area. As stated previously, wildland fire suppression has permitted fuels to accumulate and the threat of detrimental effects to unoccupied habitat from a potential high severity wildland fire to persist. Fire and fuels modeling output for the French Meadows Project indicate increased fire behaviors under all parameters under the No Action as compared to the proposed action or Alternative 3. The cumulative

effect under the No Action alternative would be a landscape increasingly at risk of high intensity wildfires due to the high levels of standing and fallen snags and a high volume of surface and ladder fuels.

Alternative 3

Provided below is a discussion of direct, indirect and cumulative effects to SNYLF and their habitat under the Alternative 3. There is no USFWS designated critical habitat in the project area or in area of analysis for cumulative effects. Therefore, there are no direct, indirect, or cumulative effects to USFWS designated critical habitat for SNYLF.

Direct and Indirect Effects

Direct effects and indirect effects to SNYLF and their habitat under Alternative 3 are similar to those described for the proposed action (Alternative 1). Table 9, below, shows changes in the acreage of forest treatments to be implemented within SNYLF suitable habitat under Alternative 3.

Table 12. Summary of Acreage of Forest Treatments Proposed Within SNYLF Suitable Habitat[1] (Alternative 3).

Treatment Type	SNYLF Suitable Habitat			Total Acreage	Change in Acreage from the proposed action
	Stream (Perennial)	Stream (Intermittent)	Wetland/ Meadow		
Mechanical Thin					
Mechanical Thin/ Mechanical Fuels Treatment	26.25	3.54	0	**29.79**	(-55.50)
Mechanical Thin/ Prescribed Fire	0	0	0	**0**	(-19.67)
Mechanical Thin (Plantations and Small Trees)					
Mechanical Thin Natural (Small Trees)/ Mechanical Fuels Treatment	59.80	5.17	0.21	**65.18**	(-97.34)
Mechanical Thin Natural (Small Trees)/ Prescribed Fire	0	0	0	**0**	(-1.16)
Mechanical Thin Plantation	2.60	0	0	**2.60**	(-0.89)
Mastication (Plantations and Natural Stands)					
Mastication Thin Natural	8.97	15.26	1.75	**25.97**	(-5.41)
Mastication Thin Natural/ Prescribed Fire	4.07	0	0	**4.07**	0
Mastication Thin Plantation	12.47	10.36	0.51	**23.34**	(-0.41)
Release Mastication (Plantation)	0	5.01	0	**5.01**	0
Release Mastication (Plantation)/ Prescribed Fire	2.33	9.09	0	**11.42**	0
Hand Thin	97.07	26.23	0.04	**123.34**	+86.28
Reforestation - Site Prep and Plant	0.96	3.74	0	**4.70**	0
Prescribed Fire	154.54	259.32	0.94	**414.80**	+94.08
Total	**369.06**	**337.72**	**3.45**	**710.24**	**0**

[1]SNYLF suitable habitat is defined to include perennial and intermittent streams, wetlands, and meadow habitats, plus a 25-meter (82-foot) upland buffer.

Overall acreage of treatments within perennial streams, intermittent streams, and wetland habitats representing suitable habitat for SNYLF would remain the same. However, acreage of mechanical thinning treatments (and, to a lesser extent, mastication treatments) proposed within these habitats would be reduced, offset by increased hand thinning and prescribed fire.

The increase in hand thinning and prescribed fire treatments within SNYLF habitat under Alternative 3 would not significantly change direct and indirect effects to SNYLF as described under the proposed action. The increase in hand thinning would theoretically minimize the potential for impacts to SNYLF from ground-based equipment; however, use of such equipment was already excluded from riparian buffers under the proposed action (and would continue to be under Alternative 3) with incorporation of management requirement W2. While the acreage of prescribed fire would also technically increase under Alternative 3, implementation of W4 would continue to prohibit ignition of prescribed fires within riparian buffers (although fire may back in to riparian buffers). The acreage of road and trail work required within suitable habitat would remain the same as the proposed action (refer to Table 9). The other management requirements incorporated into the project would also continue to contamination from use of borax or dust palliatives; and impacts to SNYLF egg masses or tadpoles during water drafting. In addition, similar to the proposed action, Alternative 3 would be expected to have minimal indirect effects on SNYLF or their habitats resulting from erosion and sedimentation or changes in hydrology, canopy cover, or water temperature.

Cumulative Effects

As described above, with incorporation of management requirements, Alternative 3 is similar to the proposed action (Alternative 1). Based on this, cumulative effects to SNYLF and their habitat under Alternative 3 are similar to those described above for proposed action.

Conclusion and Determination

Proposed Action (Alternative 1):

a) It is my determination that the French Meadows Project **will not affect** designated Critical Habitat for the SNYLF.

   Rationale: Direct, indirect, and cumulative effects will not occur to designated Critical Habitat because none exists with the project area.

b) It is my determination that the French Meadows Project **may affect, but is not likely to adversely** affect the SNYLF.

   Rationale: Direct effects are not expected to occur in the analysis area because riparian buffers and management requirements for SNYLF would be implemented. Indirect effects are limited to erosion and sedimentation or changes in hydrology, canopy cover, or water temperature. Vegetation treatments involving ground-based equipment could affect 347.76 acre (or 23 percent) of suitable habitat; however, with implementation of management prescription W2 ground-based equipment would be excluded from all but approximately 59 acres, or 3 percent of total habitat. Prescribed fire could affect 357.04 acres (or 24 percent) of suitable habitat; however, with implementation of management requirement W4, direct ignition and burning of piles would be prohibited within this acreage. Finally, road and trail work could affect 3.47 acre, representing only 0.002 percent of suitable habitat. Water drafting could also affect hydrology within suitable habitat for SNYLF, but would be limited, to the extent possible, to French Meadows Reservoir. Water drafting from other locations would require consultation with the Forest Service aquatic biologist and would be subject to the limitations of management requirements. Considering incorporation of management requirements W2 and W4, summarized above, forest treatments within 100 feet of perennial

stream habitat for SNYLF would result in only minor changes in canopy cover, which could benefit SNYLF through an increase in availability of warm water and basking areas.

The following factors led to my determination of effects of the proposed action on SNYLF:

- There would be a **negligible risk of direct effects** upon SNYLF due to the following:
    - The project will be implemented during dry soil conditions when SNYLF are unlikely to move out of aquatic habitats into upland habitats where forest treatments would be implemented.
    - Use of ground-based mechanical equipment, ignition of prescribed fire, piling and pile burning, use of existing landings, and construction of new landings or roads within RCAs and riparian buffers would be limited.
    - Use of tightly woven fiber netting, monofilament, or similar materials that could entrap SNYLF individuals is not permitted.
    - The toxicity of borate compounds, lignin sulfonate, and magnesium chloride is relatively low, and their use would be guided by appropriate no-application buffers along aquatic habitats.
    - Water drafting, to the degree possible, would be limited to French Meadows Reservoir. Consultation with Forest Service aquatic biologist, and, if necessary, surveys and avoidance/protection measures would be required prior to use of other sources representing suitable habitat for SNYLF, and water drafting methods and rates would be restricted where applicable.
- There would be a **negligible risk of indirect effects** upon SNYLF or their suitable habitat, due to the following:
    - The proposed action is designed to thin forest stands and reduce fuel loads consistent with Forest Plan RCOs and standards for old growth species, ensuring sufficient retention of vegetation to maintain soil stability, minimizing sedimentation within aquatic habitats.
    - Reduction of vegetation cover tends to increase water yield within streams. The magnitude and duration of water yields would be monitored as part of the proposed action.
    - Water drafting, to the degree possible, would be limited to French Meadows Reservoir. Use of other sources is subject to Forest Service approval, and water drafting methods and rates would be restricted where applicable.
    - Canopy cover would generally be retained within riparian buffers along suitable habitat for SNYLF. Minor decreases in canopy cover may benefit SNYLF by allowing sunlight to reach the habitats, increasing the availability of warm water and basking sites.

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APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D